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ORGANIZATION, PLANNING AND COORDINATION

IMPROVEMENT OF MANAGEMENT, PLANNING OF S&T PROGRESS

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 11, Nov 86 pp 50-58

[Article by Doctor of Economic Sciences Professor K. Puzynya and Candidate of Economic Sciences D. Barkan (Leningrad): "The Improvement of the Management of Scientific and Technical Progress"; capitalized passages published in boldface; first paragraph is PLANOVOYE KHOZYAYSTVO introduction]

[Text] The sectorial and regional management of the scientific potential. Means of reorganizing the planning of scientific and technical development. Reserves of the increase of the role of VUZ science. The democratization of the management of scientific and technical progress and economic standards.

The 27th CPSU Congress emphasized the decisive role of scientific and technical progress in the implementation of the strategic policy of the party of the intensification of the economy and the increase of product quality and production efficiency. At the same time the serious shortcomings in the management of the development of science and technology and in the activity of the basic units of the scientific potential of the country were noted. The radical improvement of matters in the sphere of scientific and technical progress requires the most complete consideration and use of the possibilities and prospects, which are being afforded by the basic directions of the reform of the economic mechanism, which were specified by the CPSU Central Committee.

Let us analyze through the prism of such reform the problems of the management of scientific and technical progress.

The basis of the efficient management of scientific and technical progress is the formulation of a unified science and technology policy. Achievements exist in this area, but for the present as a whole there is no well-balanced mechanism of the formulation of such a policy. Methods of reflecting the social and economic goals of society in scientific and technical solutions, at different levels, and by different units of the scientific potential of the country have to be elaborated. It is natural that this process requires the setting of scientific priorities, which are closely linked with the corresponding social and economic priorities. The priorities should become a working tool of the formulation of goals and the distribution of resources in scientific and technical development. As a result the real centralization of the management of scientific and technical progress will be established.

Formally the plans on science and technology are drafted within a cycle, which is common to the entire national economy and envisages the obtaining "from above" of control figures and generalized basic assignments, their analysis at the lower levels, the successive submitting of the drafts of plans "upward," and so on. In essence a significant portion of the plans reflect what the scientific and technical organizations of individual ministries and departments can, want to, and are able to do. In other words, they reflect not so much the scientific problems, the solution of which the national economy needs (from the standpoint of its long-range goals, priorities, and tasks), as the local thematic interests of the given organization and its ministry.

At present in many respects precisely the decentralized management of scientific and technical development exists. The fact that a portion of the work of scientific research institutes, design bureaus, and scientific production associations is carried out in accordance with centralized programs, changes hardly anything. The programs are frequently formulated on a purely sectorial basis and are inadequately coordinated with each other; the imperfection of the mechanism of the supervision and financing of programs makes it possible to ignore many of their assignments when fulfilling the plans of research and development of the given organization.

What are the reasons for this? Here we are coming right up to the question of the role and tasks of ministries in the sphere of scientific and technical progress. First of all it is necessary to turn them into sectorial headquarters. The breakdown of a sector among several ministries, of course, is not in the least better than its former "separation" among councils of the national economy. At present scientific research institutes, design bureaus, and scientific production associations of more than 20 ministries are conducting research and development in the field of machine building, while those of more than 15 ministries are conducting research and development in the field of radio electronics. As a result the concentration of scientific forces and assets in the most important directions is being checked and the solution of the problem of a unified advanced technological base is being complicated, since identical instrument making products are being produced by sectors in accordance with their technology.

The curtailment of research themes in the work of sectorial scientific research institutes and the predominance of minor "improving" inventions on their creative side are arousing anxiety. The ministries in their present form are not capable of solving the most difficult complex problems of scientific and technical progress both for themselves and for those who use their products, since these problems for the most part are intersectorial and interdisciplinary. The staff of the modern ministry, which is strictly oriented toward traditional volume and value indicators, does not have the skills of a scientific problem approach to the settlement of the questions of scientific and technical progress, and is confined to subsectorial goals, will not ensure a high rate and efficiency of innovative processes.

Today the need for the consolidation of ministries is quite obvious. Another thing is less obvious: the simple merging of similar small ministries into

one large one, of course, will not yield a significant positive impact (as any intelligent concentration), while the main problem lies in the special-purpose reorientation of these future sectorial headquarters. The point is that they should become headquarters of the formulation and implementation of the UNIFIED SCIENCE AND TECHNOLOGY POLICY OF THE SECTOR as a part of the national economic complex. "The main thing, on which ministries should concentrate their activity under present conditions," it was noted at the 27th CPSU Congress, "is the determination of the strategy of scientific and technical progress in the sector and the prospects of its development, the increase of the overall level of economic work, and, in the end, the complete meeting of the needs of society for products." (Footnote 1) ("Materialy XXVII syezda Kommunisticheskoy partii Sovetskogo Soyuza" [Materials of the 27th Congress of the Communist Party of the Soviet Union], Moscow, Politizdat, 1986, p 252)

The present ministry is oriented primarily toward day-to-day work with subordinate enterprises, but it is necessary that the specialists of the sectorial headquarters would use extensively in their practical work scientific and technical forecasting, strategic planning, marketing, problem-oriented evaluations, and so on. The sectorial system of the management of scientific and technical progress can be transformed into a comprehensive system of the making of strategic planning decisions, which ensure the priority of national economic problems in the development of science, technology, and production and high end results of scientific and technical progress.

The future scientific and technical headquarters of sectors should receive active support from the USSR State Committee for Science and Technology and the USSR State Planning Committee. The new orientation of the activity of these central organs was clearly outlined at the 27th party congress. Let us merely note that the consolidation and change of the goal orientation of the work of ministries are a decisive prerequisite of changes.

THE EXTENSIVE AND IN-DEPTH FORECASTING AND ANALYTICAL ACTIVITY OF THE STATE COMMITTEE FOR SCIENCE AND TECHNOLOGY ON THE FORMULATION AND PURSUIT OF A UNIFIED SCIENCE AND TECHNOLOGY POLICY IN THE NATIONAL ECONOMY IS POSSIBLE ONLY ON THE BASIS OF THE SCIENTIFIC EVALUATION OF THE SECTORIAL PROSPECTS OF SCIENTIFIC AND TECHNICAL DEVELOPMENT. BUT THIS EVALUATION ACQUIRES BREADTH, VALIDITY, AND SOCIAL SIGNIFICANCE ONLY WHEN IT TAKES INTO ACCOUNT INTERSECTORIAL NEEDS AND THE ROLE OF THE GIVEN SECTOR IN THEIR MEETING. THE COMBINATION OF SECTORIAL AND INTERSECTORIAL SCIENTIFIC, TECHNICAL, AND SOCIOECONOMIC FORECASTING AND THEIR ACTIVE INTERACTION CREATE A REAL BASIS FOR EFFECTIVE STRATEGIC PLANNING AT THE LEVEL OF THE SECTOR AND THE NATIONAL ECONOMY AS A WHOLE.

At the same time, no matter how effectively the tasks of scientific and technical progress are accomplished at the top levels, in any event the decisive role belongs to production, which is dispersed among specific regions, and only the technology and products of industrial enterprises actually reflect the level and efficiency of the use of the results of scientific research. The strategic management of science and technology within the sector will not yield the desired result, if just as effective a system of the "tactical" management of the development of scientific and

technical progress does not exist in the given region and at the enterprise. Today the problems of scientific and technical progress and the economic development of regions are urgent for many countries. Under the conditions of the socialist economy they can be accomplished most effectively. (Footnote 2) (In this connection it interesting to note the experience of developed capitalist countries. For example, the United States and France are rapidly forming regional centers of the development of science and technology. Moreover, this concerns not only the well-known "parks" of the United States like Highway 128 or Silicon Valley. The bourgeois states are exerting considerable efforts for the establishment of powerful regional centers of scientific and technical information (Japan) for the stimulation of the development of science-intensive sectors of industry in underdeveloped regions (the countries of Western Europe), and so on.) In case of the planned management of the economy the role of the region as the center of economic management is determined by its inherent flexibility, efficiency, the most extensive possibilities of intersectorial cooperation, scientific and technical collaboration, the comprehensive solution of personnel problems, and so on. The question of the motive forces of scientific and technical progress in the economic region is significantly more complex.

It seems that today the level of the scientific and technical potential of many enterprises, higher educational institutions, and a number of local research organizations makes it possible to carry out the "tactical" management of scientific and technical progress in the region. The uniting of their efforts with an orientation toward the SECTORIAL AND INTERSECTORIAL PROBLEMS OF SCIENTIFIC AND TECHNICAL PROGRESS, as well as the prospects of the development of regions, and so on can be accomplished by the system of management of the economic region.

Let us examine a possible mechanism of the coupling and separation of the functions on the management of scientific and technical progress in the "ministry-region-enterprise" chain.

The assurance of the normatively established pace of scientific and technical progress at the enterprises subordinate to them by the pursuit of a UNIFIED SCIENCE, TECHNOLOGY, AND INVESTMENT POLICY is becoming the leading function of sectorial ministries. For this the ministries form and develop a number of main scientific research institutes, scientific production associations, and planning institutes (in sufficiently broad directions of science and technology), which, as a rule, are small in size and have a powerful technical base. The State Committee for Science and Technology and the USSR Academy of Sciences are establishing interbranch scientific technical complexes, which conduct research and development in those spheres, where integration and interdisciplinary processes are especially strong.

The main scientific research institutes, scientific production associations, and planning institutes of the sector, in carrying out the corresponding research and planning operations, create a sufficiently complete information base for the implementation of the unified science, technology, and investment policy of the sector. The ministries concentrate the assets for capital investments, which are allocated to the sector.

WITH ALLOWANCE MADE FOR THE SECTORS, WHICH HAVE BEEN FORMED IN THE REGION, AS WELL AS THE PROSPECTS OF DEVELOPMENT OF INDIVIDUAL WORKS, THE ECONOMIC REGION IS CAPABLE OF FORMING SECTORIAL PRODUCTION SCIENTIFIC AND TECHNICAL CENTERS. Scientific and technical subdivisions of associations and enterprises, chairs of higher educational institutions, and some narrowly specialized scientific research institutes and design bureaus of sectorial subordination can constitute their framework. The development of new and the modification of existing equipment and technology on the basis of the use of the scientific and technical achievements of the main sectorial scientific research institute and scientific production associations are included in the tasks of such centers. The regional scientific and technical centers conclude with the institutes contracts, in accordance with which they receive the latest results of applied scientific research, the necessary documents, patronage assistance, and so on.

Regional organs of economic management (wherever they exist) on the basis of consultation with the appropriate ministries could organize and implement all types of capital construction in the interests of the development of industry of the region. Here they, of course, will be concerned with the proportionality of development of both the infrastructure and the production base of the region, while a high scientific and technical level of new construction, expansion, and renovation will be guaranteed on a contractual basis by the ministries.

On the basis of the control figures of the USSR State Planning Committee in economic regions it would be possible to formulate for the five-year plan a program of the output of series-produced and modernized products, as a rule, on the basis of developments of operating scientific and technical centers, interbranch scientific technical complexes, and scientific production associations.

At present the planning of the development of the scientific potential presumes the long-range study of scientific problems and the evaluation of the conformity to them of some elements or others of the scientific potential and the program of the formation, temporary closing, and reorientation of scientific, design and technological, and planning centers. Some work is being performed in this direction, but its scale is small, since there is no common national economic organ, which could organize it, direct it, and support it procedurally. The scientific and technical potential, which is distributed among tens of ministries and departments, is difficult to manage, while not special-purpose, but resource-limiting levers (the amounts of capital investments, places in graduate studies, and so forth) are the only regulator of centralized influence on its development. Of course, at times it is advisable to establish a new scientific research institute, design bureau, and division for one problem or another. But this cannot be the general direction of development of the scientific potential. And it is a matter not only of the limitedness of resources, the rapid exhaustion of the "virgin land" of promising ideas and themes in specific scientific directions is urgently raising the question of the use of the potential that has been created there. Consequently, the state centralized planning of the development of the scientific potential should reflect the priorities, problems, goals, and tasks of the unified science and technology policy.

At a number of institutes of the USSR Academy of Sciences a significant portion of the work is of a purely applied nature. If the successes of basic science, as they say, "had been overwhelming," it would be possible to understand such a situation. But for all the indisputable achievements of academic scientific centers the relatively modest level of the number of discoveries, the negligible proportion of major discoveries, and others cannot but cause anxiety.

Above we examined the state of sectorial science and will note here only one trend of its present development. It is a question of the aspiration of ministries to establish newer and newer scientific and technical organizations, especially in regions which are being newly developed. This is being done under the pretext of the scientific support of developing regions and the sectorial works in them. Under the conditions of the lack of a unified plan and an evaluation of the development of the scientific and technical potential it is difficult to oppose anything to this. At the same time cases of the scientific untenability of similar undertakings are frequently covered in the press.

The situation with the use and development of the scientific potential of higher educational institutions is even more complicated. For long years the question of the goal orientation of VUZ science has been debated futilely. The researchers of the higher school have not found their place in the structure of the scientific potential of the country. Up to 90 percent of the research and development being conducted by higher educational institutions is economic contractual research and development. Higher educational institutions conclude them, as a rule, with associations and enterprises and much more rarely with ministries. Operations of production and scientific service, which for various reasons sectorial science does not wish to undertake, predominate in the themes. Of course, there are examples of the efficient use of the VUZ scientific potential and fruitful contacts of large higher educational institutions and associations, but the overall state of affairs is not improving.

In our opinion, the inclusion of a VUZ chair in a specific regional scientific and technical center would provide many higher educational institutions with a stable field of activity and long-range business and scientific contacts. This would help them to solve the most difficult scientific problems and would be of enormous benefit to the educational process as a whole and to each student. "With the first years of instruction," M.S. Gorbachev noted at the 27th CPSU Congress, "students should be involved in research work and should participate in the introduction of its results in production." (Footnote 3) ("Materialy XXVII syezda Kommunisticheskoy partii Sovetskogo Soyuza," p 28) And if one chair or another has not determined its role in regional scientific and technical development and is not included fundamentally in the structure of a specific scientific and technical center, it is necessary to analyze how serious the grounds are, in accordance with which within the given higher educational institution there is an educational scientific collective, which has been deprived of a base of the practical use of its scientific results, and to what extent under these conditions the chair can train full-fledged specialists. The question of the efficient distribution of the VUZ potential

among regions would acquire a quite weighty criterion for its settlement. We do not regard such a criterion as the only one, but its underestimation is fraught with enormous losses both for the training of personnel and for the effectiveness of VUZ science.

Let us examine another problem of scientific and technical progress--the problem of INTRODUCTION. The old management truth states that it is possible to eliminate an element of a system, but not its function. Therefore, the problem of introducing the results of applied research and development cannot be eliminated, as they did at one time in several introducing organizations. The necessity and utility of these organizations are confirmed by existing experience. It is also possible to borrow much that is useful from foreign practice. For example, innovation agencies, which give assistance to inventors and talented specialists in the development and introduction of scientific and technical innovations, operate in Hungary. Here the material interests of innovative specialists are being successfully combined with guarantees of an economic gain for the state. In our country such agencies could operate within regions, under their scientific and technical centers, which can make in a qualified manner an appraisal of suggestions, create the organizational conditions, and help in supporting the experimental portion of resourceful operations.

Domestic experience of the regional development of the scientific and technical potential attests to the great possibilities of its use. For example, in Lvov four scientific production complexes (machine building, instrument making, geological, and agricultural), which include more than 30 enterprises and organizations of the region, were established on the basis of a number of institutions of the Ukrainian SSR Academy of Sciences and 17 sectorial scientific research institutes, planning and design organizations, and higher educational institutions. They have developed and introduced a large number of designs of new equipment, technology, and so on with an enormous economic impact. The experience of the operation of the Northern Caucasus and Bashkir scientific centers of the higher school, which has been covered extensively in the press, also merits attention. There are also many other examples of the most efficient use of the scientific potential within the economic region. But for the extensive realization of such possibilities two conditions are necessary:

--the unified centralized management of the scientific potential, in which the strategic balance between the emergence and formulation of important scientific and technical problems and the development of the structure and the functions of the potential as a whole and its individual units is ensured;

--a comprehensive system of the planning of research and development, which ensures their orientation toward the achievement of high results.

Precisely planning governs the unity of all the elements of the development and use of the potential, if it is linked procedurally with the problems, that is, the indicators of the results reflect the level and scale of solution of the corresponding scientific problem. The plans of the scientific and technical centers of regions, being based on the results of completed scientific research, should ensure the development of world-level equipment.

Here the strict coordination of the evaluation of the activity of associations and enterprises with the scale of the appearance of their products on the world market is necessary.

Associations, which are acutely interested in a stable position on the world market, will force their scientific and technical centers to develop scientific research and experimental design work at the world level. In turn, the centers should receive from the main sectorial scientific research institutes and scientific production associations results of the corresponding class, while this binds the latter to the constant assimilation of basic discoveries. The advantages of the centrally managed economy of socialism will appear clearly here.

The changeover of the economy to the path of intensification involves cardinal changes in the equipment and technology of production and management and the transition from evolutionary scientific and technical development to a revolutionary type of innovations in all the key sectors of industry and the national economy as a whole. Not only the scale and complexity of innovative tasks and, hence, the processes of the management of their accomplishment are changing qualitatively. It is a question of the change of the role of scientific and technical progress. From a certain "appendage," which from time to time improves to a greater or lesser degree equipment and technology and then again "recedes into the background" (and does not interfere with the established course of the production process), scientific and technical progress is turning into a central element of production. Precisely its pace today determines the progressive nature of the sector, for which the so desired "organized production" is merely short rests between the dynamic processes of the assimilation of the next technical and technological innovations.

But revolutionary transformations in science itself are the decisive prerequisite of such changes, since they determine the pace of scientific and technical progress in production. It is a question of the increasingly more rapid and broader use by applied science of the achievements of basic knowledge. It would be incorrect to assume that the sphere of applied research and development is less inclined to stagnation and inertia in the sense of the introduction of basic ideas than production with respect to its own results.

The need for the extensive development of basic research and the more strict orientation of academic science toward the obtaining of quite significant results was noted at the conference in CPSU Central Committee on questions of the acceleration of scientific and technical progress.

At the same time the problem of their effective use in applied scientific research and experimental design work and development is becoming more and more urgent. Introduction as a process begins not at the "science-production" meeting point, but at the boundary of basic and applied scientific research work. The level of progressiveness of the equipment, which industry will assimilate, is formed precisely here. The settlement of the question of who will "take" this most important boundary of introduction and how, is closely connected with the present state of sectorial science, the formulation and

implementation of the unified science and technology policy, and the correlation of centralism and decentralization in the management of scientific and technical progress. And, of course, the fact that the logic of analysis again leads to the problems, which were covered above, is not accidental. They are key ones in the sphere of scientific and technical progress, especially in the sphere of the intensification of the economy as a whole.

The directions of the improvement of the organizational forms of the system of decision making, the development of the potential, and the introduction of the most valuable results of scientific research--all this should also be backed by the corresponding progress in the planning of scientific activity.

It turned out historically that the theory and practice of the planning of scientific and technical progress in general and research and development in particular formed and developed with allowance made for the basic theoretical principles of production planning, which had already been formulated by that time. But since the achievements of what is called the "genetic" approach are the basis for it, the conceived theory and practice of the planning of scientific and technical progress also acquired all the shortcomings of such an approach. The main ones of them are: an orientation toward quantitative volume indicators, first of all of a resource nature, which enable the center to strictly limit the resources being allocated, as well as the confusion in the final indicators of both elements of the results proper and the expenditure components. Unfortunately, a fundamentally different set of plan indicators, which reflect clearly and comprehensively first of all the qualitative aspect of the results of scientific and technical progress, and especially research and development, has been inadequately elaborated. Only enthusiastic scientists are performing such work.

The indicator of the volume of completed research and development, which is presently planned, forces the collective to agree to an increase of expenditures. However, it is the main one in the plans of research and development at all levels. The indicator of the labor productivity of researchers and designers, which is calculated in the volume of research and development per worker, is also just as unfounded. There is no clearly regulated terminological interpretation of such a concept as introduction. If we add to this the weakness of the standard accounting base of planning, the urgent need for theoretical research in the area of planning activity becomes obvious. It is a question first of all of the thorough and comprehensive elaboration of the problems of the economic evaluation of the use value and quality of the scientific product. An advanced set of plan indicators, which reflects the socially significant results of scientific research and the socially necessary expenditures of labor, cannot be developed without this.

In the past 20 years substantial positive changes have occurred in the methods of the planning work in question. Network methods, mathematical economic models, and goal program approaches have been introduced in planning practice. However, the techniques themselves and the overall progress of automation in planning work have not been able to lead to the radical improvement of the management of scientific research and planning and design activity in the country. For their introduction and use were carried out outside the unified conception of the improvement of the planning of research and development as a

component of the general program of the reform of the management of scientific and technical progress. This conception should still be developed by the efforts of many scientific collectives and experienced workers.

The radical change of the nature of the centralized planned management of scientific and technical development and the use of advanced organizational structures in its management can yield a real impact only if the appropriate economic prerequisites exist. Therefore, the granting to all structural scientific and technical subdivisions of the maximum economic independence, the extensive introduction of contracts in the practice of the interaction of sectorial and regional organs of the management of scientific and technical progress, and their extension to the entire system of relations in this sphere are also necessary. But economic interest, responsibility, sanctions, and so on are just as important. The complete economic responsibility of scientific research institutes, scientific production associations, and scientific and technical centers presumes their provision with sufficient monetary assets, extensive access to credit, and so on. Much of this has already justified itself in practice. At the same time the reform and development of the standard legal base, without which effective management is inconceivable, have to be expedited. It is extremely important to broaden the possibilities for economic maneuvering of the scientific and technical organization. In this connection, for example, limitations of the salary increments of researchers and designers are undesirable. The experience of the Leningrad experiment on the remuneration of the labor of designers and process engineers convincingly demonstrated the great effectiveness of the lifting of such limitations.

The sectors are gradually changing over to the standard formation of the wage fund for the sphere of research and development. However, the effectiveness of the standards, which are established after the fact, is low. Consequently, the elaboration of scientific substantiations of their amount is required. A temporary collective of scientists and specialists, for example, would be capable of this.

Under the conditions of the establishment of regional and intersectorial scientific and technical centers the question of the remuneration of the scientific labor of instructors of higher educational institutions, who are occupied with economic contractual themes, is also acquiring particular urgency. The prevailing procedure of the combination of jobs within a higher educational institution needs revision. Without serious scientific work there can be no full-fledged educational process. Every instructor should engage in it. Remuneration for it should also be mandatory and invariable.

It seems that it would be advisable to borrow the experience of the GDR, where this portion of the remuneration is included in the fixed wage of instructors. This step in essence will not require additional assets, while the main problem will be solved effectively. The region will be interested in the maximum use of its higher educational institutions and in the development of the chairs and faculties, which are characteristic of it. While the centralized management and planning organs will be able to evaluate objectively the need for the creation, reorientation, or curtailment of the

corresponding elements of the educational scientific potential of the higher school.

The changeover of VUZ personnel to the new system of the remuneration of labor in the sphere of research and development is no less important. As a result VUZ science will receive a powerful stimulus of the increase of the creative activity of the most talented scientists, as well as an effective means of getting rid of fruitless "scientific ballast."

Among these measures is the efficiency distribution of VUZ research between state budget and economic contractual themes. There is also meant here the amount of research, which is performed at the expense of the second half of the day by professors and instructors. The fulfillment of such state budget work is a mandatory condition of the participation of instructors in paid economic contractual themes. Unfortunately, this research is frequently of a purely formal nature, primarily due to the overloading of instructors with educational methods activity. At the same time their problems are quite important. It would be advisable to permit the management of higher educational institutions to distribute scientific themes independently among instructors, directing the attention of some to the fulfillment of a greater amount of state budget scientific research with the corresponding remuneration and others to economic contractual jobs.

The need has also arisen to permit the combining of staff positions for professors and instructors at scientific institutions of higher educational institutions, which are carried on the state budget. The additional expenditures will be relatively small, while the impact will be significant. And, of course, science of the higher school has experienced for a long time the urgent need for the more well-founded distribution of the planned amounts of state budget and economic contractual operations among higher educational institutions. Let us note in passing that the Leningrad Institute of Engineering Economics formulated for the RSFSR Ministry of Higher and Secondary Specialized Education a number of proposals on the standardized distribution of the amounts of all types of research and development and limited resources with allowance made for the educational scientific potential of the higher educational institution. However, the introduction of the proposals for the present is being delayed.

Let us examine several aspects of the democratization of management, without which effective reform in the supervision of scientific and technical progress is also impossible. Such democratization should have its own tools. A portion of them are connected with the development of the spheres of control and openness and the broadening of the rights of labor collectives in the planning, evaluation, and stimulation of the development of science and technology. Here the possibilities of improving management are especially great, since the collectives of scientific, design, and planning organizations consist of highly educated people, in them there are many genuine creators and innovators.

Much is already being done on the expansion of the democratization of the economic mechanism, but the basic innovations in part still await introduction

and in part have to be developed. A large-scale experiment, analysis, and comprehensive evaluation are important here.

At the same time the role of traditional economic tools, and first of all standards, is substantial in the democratization of management. "If, for example, it is necessary and justified instead of some directive indicators to use economic standards," it was noted in the Policy Report of the CPSU Central Committee to the 27th party congress, "this means not a departure from the principles of planned management, but merely a change of its methods and techniques." (Footnote 4) ("Materialy XXVII syezda Kommunisticheskoy partii Sovetskogo Soyuza," p 39) Norms and standards as the basis of planning lend a sound nature to economic relations. Centralism, which is based on a well thought out set of standards, reflects more completely the essence of democratic centralism. The soundness of this set is the thorough understanding by the center of the tasks of development, on the one hand, and the possibilities of local units, on the other; the ability to establish a connection of the results and expenditures, which is profitable for the national economy and the given unit.

Such demands also fully apply to the management of scientific and technical progress, and first of all to planning. Problems, results, and various elements of the potential--all this should be substantiated in a standardized manner in the corresponding plans and should be obtained in practice. This is especially important as the planning of scientific and technical progress today in many respects lacks even local standards.

The study of the problems of the standardized regulation and introduction of the corresponding results in the practice of the planning of scientific and technical progress at all levels is an important task of economic science. There are several key questions here, but the main one is connected with the formulation of a set of consolidated standards, which regulate the diversity and scientific and technical level of the basic products which are produced by the leading sectors of industry. A number of methods of evaluating the scientific and technical level of research and development have now been formulated, several of them are being used. However, there is no unified statewide regulation in this most important matter.

It is extremely important to change over the measurement and evaluation of the scientific and technical level to a "standardized basis." It can and should be given and achieved in a standardized manner. We are far from the simplifications, which are connected with the recognition of the world level of technical and economic indicators as the only possible reference point. The values of the goal and priority of socialism in many cases will make it incumbent to compare the social significance and consequences with the possible economic advantages for some large-scale innovations or others. The development and efficient use of the corresponding standard regulators are all the more important.

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SCIENCE, TECHNOLOGY COMMISSION OF USSR SUPREME SOVIET

Glebov Interview

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 22, 18 Nov-1 Dec 86 pp 4-5

[Interview with Academician Igor Alekseyevich Glebov, chairman of the Permanent Science and Technology Commission of the Council of the Union of the USSR Supreme Soviet, by A. Lepikhov: "In the Field of View of the Deputy Commission.... The Chairman of the Permanent Science and Technology Commission of the Council of the Union of the USSR Supreme Soviet Tells About Its Work"; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] The highest organ of state authority of our country--the USSR Supreme Soviet--holds its sessions, as a rule, no less often than twice a year. They are short--they last only a few days. But does what has been said mean that the activity of the deputies is confined only to this time? Of course not. During the breaks between the sessions the Kremlin halls are by no means empty. First of all the Presidium of the USSR Supreme Soviet, which gathers at its meetings, as a rule, monthly, works here. The commissions of the Council of the Union and the Council of Nationalities, which are simply named: permanent, also ensure the continuity of the work of the USSR Supreme Soviet. They are formed at the first session of the new convocation in each of the chambers for their entire term of office. The number of commissions is in no way restricted by law, and new ones can be formed as needed. Today in the Council of the Union and the Council of Nationalities there are 17 commissions each by the same name, of which 1,210 deputies, that is, 80.7 percent of their total number, have been elected members. The members of the permanent commissions discuss in advance the questions, which will be submitted for the consideration of one session or another of the Supreme Soviet, contribute to the implementation of already adopted decisions, engage in diverse organizing work, and monitor the activity of state organs, enterprises, institutions, and organizations. At the request of our correspondent the work of one of them--the Permanent Science and Technology Commission of the Council of the Union of the USSR Supreme Soviet--is told about by Academician Igor Alekseyevich Glebov, its chairman.

[Question] Igor Alekseyevich! Who can be a member of the Permanent Commission which you head?

[Answer] If you do not object, I will answer first another question: Who cannot be a member of both our and any other permanent commission?

In conformity with the regulations of the USSR Supreme Soviet deputies, who belong to several state organs, cannot be members of commissions. This "ban" extends to the chairmen of the chambers and their deputies and to the members of the Presidium of the USSR Supreme Soviet, the USSR Council of Ministers, and the USSR Committee of People's Control. Members of the USSR Supreme Court and the Procurator General of the country also cannot be members of permanent commissions.

The point of such a "ban," I hope, is clear: the opinion of people, who have authority, should not influence the work of the commissions.

Today 35 people are on our science and technology commission.

[Question] Are they probably mainly scientists?

[Answer] If we speak about members of the USSR Academy of Sciences, there are only four of them, including the chairman of the commission. Among the members of the commission there are 10 workers, 8 agricultural personnel, managers of scientific research institutes and industrial enterprises, and party personnel.

When forming the makeup of the commission, of course, the desire and possibilities of the deputies, their vocational training, the existence of a "critical element," and the ability to defend one's own point of view are taken into account.

[Question] What is the "technology" of your work?

[Answer] We work in conformity with a plan, which has been drawn up in advance, but gather both before the very sessions of the Supreme Soviet and during the breaks between them. Special preparatory commissions are formed for the analysis of the materials which are submitted by ministries and departments. All our activity is based on the collective, free, and practical discussion of the questions being considered; the decisions here are made by a simple majority. I will probably not be revealing a great secret if I say that in our commission, as in any collective, there are "leaders" and "laggards," there are people, who constantly advance new ideas and come forth with initiative, but there are also those who merely perform the assignment given to them, but always do this exceptionally conscientiously.

I believe that it should be clear to you that no matter how representative the makeup of the science and technology commission is, we cannot be completely competent in all the issues being discussed. Therefore, the law permits us to enlist in the activity of the commission representatives of any state and public organizations, prominent specialists, and scientists for the collective search for the most correct solutions.

[Question] Igor Alekseyevich, would you, perhaps, tell in greater detail about the consideration of some one specific issue?

[Answer] All right, let it be the work of the USSR Ministry of the Coal Industry on the fulfillment of the assignments of the Energy Program on the basis of the fundamental modernization of the sector in light of the decisions of the 27th CPSU Congress.

The "analysis" of this issue was begun in good time. First of all a joint deputy preparatory commission made up of 11 people was formed.

Further, the necessary inquiries were sent out already at the beginning of March 1986 to the USSR Ministry of the Coal Industry, the State Planning Commission, and the State Committee for Material and Technical Supply of the country, and the State Committee for Science and Technology--in all to 12 union ministries and departments, as well as to the Ukrainian SSR Council of Ministers. The materials, which were requested by the energy and the science and technology commissions, were received by us in good time. The members themselves of the preparatory commission familiarized themselves with the work of mines, coal pits, concentrating mills, and machine building plants of the USSR Ministry of the Coal Industry in six union republics. Moreover, the deputies, who are not members of the preparatory commission, but are working on the permanent science and technology and energy commissions of the Supreme Soviet, familiarized themselves with the state of the renovation of coal enterprises on the territory of their electoral districts. Their analytical notes, remarks, and proposals were also sent to the commission.

The joint meeting itself of the Energy Commissions and the Science and Technology Commissions of the Council of the Union and the Council of Nationalities was held on 23 July. But the 3 months--between April and July--were, perhaps, the most intense in the work of the members of the joint preparatory commission. This was a time of the analysis of tens of notes and surveys on the state of the coal industry, requests for additional information, meetings with executives of the coal industry, and the preparation of generalizing material for the members of all four permanent commissions, as well as a draft of their decision.

After the holding of the joint meeting of the permanent commissions of both chambers another few days were spent on the consideration of the remarks of the deputies, which were made by them during the discussion of the draft of the decision. During these days the list of ministries and departments of the country, as well as other governmental organs, to which the adopted decision and other materials of the work of the permanent commissions would be sent, was also specified.

But the work of the commissions by no means ended with this. By 1 September 1987 the USSR Ministry of the Coal Industry, the State Planning Committee of the country, and a number of other ministries and departments should report on the results of the work on the implementation of the recommendations and the elimination of the noted shortcomings. Then we will be able to properly evaluate the effectiveness of what has been done by the deputies of the USSR Supreme Soviet in the course of nearly 5 months of this year.

[Question] Perhaps, you have already completely revealed the mechanism of the work of the Permanent Science and Technology Commission....

[Answer] Not entirely. You have spent several days here, attended meetings, and familiarized yourself with the work of our consultants and experts. And, I believe, you have been able to notice that here they are working very intensely, but without any fuss, in a precise rhythm. All this in many respects is to the credit of the Department for the Work of Permanent Commissions. In general, I almost do not notice the organizing work of the staff members of the Department of Permanent Commissions--apparently, because it is performed at the highest professional level.

[Question] You have told in sufficient detail about how the members of the permanent commissions work. It seems that it is the right time to move on to an account of the content aspect of this work. Do you agree?

[Answer] Not only do I agree, but I have already asked that the necessary materials, in which the work of the USSR Ministry of the Coal Industry is examined, be brought. So let you and I again look through these hundreds of pages of documents.

I will immediately stipulate. In the first 6 months of this year the coal industry for the first time in several years exceeded the plan of production and the assignment on the increase of labor productivity. However, in all the documents attention is focused not on the successes, but on the problems and unsolved tasks. So let us also dwell precisely on this aspect of the matter.

Here is the report on the work of the Aleksandriya Coal Production Association of the Ukrainian SSR Ministry of the Coal Industry. Its output is more than half of all the brown coal briquettes produced in our country. In 1975 for the association as a whole their output came to 4.3 million tons, while 10 years later it came to only 2.56 million tons. At the warehouses of coal mining enterprises in April of this year more than 1 million tons of above-standard balances of coal had accumulated, but it, as is known, in case of long-term storage drastically worsens its properties and ignites spontaneously.

The reason for the worsening of the work of the association is simple--all the basic production equipment, which has been installed at the briquette factories, was produced...at the end of the last century and the beginning of the present century. The correspondence of party, soviet, and economic organs and the Kirovograd Oblast Committee of the Communist Party of the Ukraine (the Aleksandriya Coal Association is located in Kirovograd Oblast) with the ministries of the coal industry of the country and the Ukraine and with the USSR State Planning Committee on the renovation and construction of new coal-processing enterprises and the establishment of balanced and realistic plans of the mining and processing of coal went on for nearly 5 years. But due to the irresolute and inconsistent position of the USSR Ministry of the Coal Industry none of the raised issues was ever settled.

And here is what kind of situation formed at the Karaganda Coal Association, with the analysis of the work of which Deputy V.P. Zimenok dealt. Here of the

26 mines and 2 coal pits 13 mines and 1 pit did not fulfill the 5-year assignments on coal production. Due to this the national economy did not receive 5.8 million tons of coal, including more than 3 million tons of the most valuable coal--coking coal. The basic reason for such "successes" is the chronic lag in the performance of capital mining and preliminary mining operations. During the current five-year plan the USSR Ministry of the Coal Industry has also allocated obviously insufficient assets for the construction of new horizons in the Karaganda Basin.

There is another detail: during the years of the 11th Five-Year Plan the number of workers in coal mining here increased by 6,000, while their labor productivity decreased by 9 percent.

An extremely tense situation with housing has formed for miners. You probably know that during the past five-year plan the coal reserves, which lie within the city of Karaganda with its dense building up with residential, industrial, cultural, and personal service buildings, were reactivated. Under the built-up areas 45 million tons of coal were mined; in so doing buildings with a total area of 481,000 square meters received breaking strains. During the current five-year plan, with the planned mining of 48.7 million tons of coal, in Karaganda about 200,000 more square meters of housing will be destroyed.

Back in 1980 it was envisaged to build 577,000 square meters of living space. However, this assignment was not fulfilled, and in the city of miners about 300,000 square meters of unsafe housing have accumulated.

Deputy V.P. Zimenok directed the attention of the members of the permanent commissions of the USSR Supreme Soviet to the fact that during the 12th Five-Year Plan the situation in Karaganda will only deteriorate. Given a need for 1.33 million square meters of housing it is planned to build only 185,000 square meters.

Deputy O.A. Kaybyshev, who studied the state of affairs in the Bashkir Coal Production Association, noted that during the years of the 11th Five-Year Plan the total volume of coal production here decreased by 31.4 percent, labor productivity and industrial production decreased to nearly one-half, while the wage...increased by 16.2 percent.

Deputy V.V. Plisov, who analyzed the work of the coal mining industry of Krasnoyarsk Kray, wrote that so far there is no specific program which specifies to 2000 the balance of the production and consumption of Kansk-Achinsk coals. The number, sequence, and time of construction of both state regional electric power plants and large works for the thorough processing of these coals with attachment to specific pits and deposits have also not been specified. Moreover, none of the proposed methods of such processing has undergone tests on a commercial scale.

Many ministries and departments are dealing with the problems of the assimilation of Kansk-Achinsk coals. But since "too many cooks spoil the broth," V.V. Plisov proposed to establish in Krasnoyarsk Kray a single organ of the management of the Kansk-Achinsk Basin with its subordination directly to the Bureau for the Fuel and Power Complex of the USSR Council of Ministers.

And here are the data of the USSR Committee of People's Control: "While having used enormous capital assets, the USSR Ministry of the Coal Industry did not ensure the prescribed increase of coal production and allowed the worsening of many technical and economic indicators of its work." The USSR Committee of People's Control noted that the coal industry of the Ukraine was in an especially bad situation. During the past five-year plan more than 6 billion rubles were channeled into its development. All of them were spent, but coal production, as compared with 1980,...decreased by 8 million tons. I will add that the labor productivity of Ukrainian miners decreased by 11 percent, while the cost of coal production increased by 30 percent.

Against the background of all these documents the letter of USSR Deputy Minister of the Coal Industry G.I. Nuzhdikhin sounded very optimistic. He reported to the permanent commissions that during the past 5-year period the Neryunginskiy Pit and a concentrating mill in the city of Neryungi had been built. The first section at the new Vostochnyy coal pit in the Ekibastuz Basin and the Tyulganskiy pit in Orenburg Oblast had been put into operation. The capacity of the Borodinskiy pit in the Kansk-Achinsk Basin had also been increased due to renovation.

We would only rejoice at the successes of our coal miners, if we did not know from other documents that, say, the first section of the Tyulganskiy pit should have been put into operation in 1976, and not during the fourth quarter of 1983. And that instead of 4 years it was under construction for an entire 9 years. In exactly the same way the renovation of the Borodinskiy pit was completed with a delay of 4 years.

The USSR deputy minister of the coal industry for some reason also forgot to mention the fact that the placement of capacities into operation at the Neryungi Coal Pit of the Southern Yakut Complex was 3 years "late," and the concentrating mill--2 years. Due to this the total losses in coal mining came to more than 20 million tons.

[Question] Apparently, it is impossible to evaluate such "objective" notification of the permanent commissions of the USSR Supreme Soviet as anything but the typical defense of the "honor" of the departmental uniform.

[Answer] I believe that here you and I are united in the evaluation. But here is what else I would like to add. In many explanations of the coal miners the blame for the nonfulfillment of the production assignments for the past five-year plan is explicitly or implicitly placed on objective conditions--the worsening of the geological mining conditions of coal production.

Yes, indeed, in the past decade the depth of shaft mining has increased on the average by 90 meters, while the share of mines 800 meters deep has increased by more than twofold.

But such deterioration, it is stated in the extremely detailed report of the USSR Academy of Sciences, which is inevitable for individual mining enterprises, is not at all mandatory for the entire sector as a whole. For

this it was necessary to begin in good time the reorganization of the structure of mining in favor of strip mining in the Kuznetsk, Ekibastuz, and Kansk-Achinsk Basins. It is natural that it is necessary to strive for the optimum combination of the development of "old" and "new" basins.

You will agree that it is necessary to be able to count very poorly in order to allocate unjustifiably large capital investments for the renovation and maintenance of mines in "old" basins with unfavorable geological mining conditions. But specialists are well aware that the increase of coal production, which is achieved in this case, is very short-lived. Thus, during 1976-1980 by means of various organizational and technical measures the capacity of mines was officially increased by 15 million tons, while the actual increase of production at them subsequently came to only 4.4 million tons, and then mainly due to work on days off.

Well, what kind of "geology" is to blame for the fact that numerous auxiliary operations in mines today are performed manually, while the time of the operation of combines directly in the cutting of coal decreased to 30 percent of the duration of the work shift? According to the estimates of our scientists, last year alone due to factors, which are mainly of an organizational management, and not a "geological mining" nature, the direct losses in coal mining came to 35 million tons. Are these objective factors or not? And how, except as the inability to think in terms of the future and the lack of real concern about people, is it possible to explain that the housing conditions of miners are appreciably worse than in a number of other sectors of industry and that the turnover of personnel during the past five-year plan in the USSR Ministry of the Coal Industry came to 13-15 percent?

[Question] I am familiar with the decision which was adopted after the joint meeting of the permanent commissions of both chambers. It is large in size--about 10 typed pages. But could you comment on the basic provisions of this decision?

[Answer] Its main point is probably the one in which it is stated that the reorganization of the work of the USSR Ministry of the Coal Industry on the acceleration of the development and the increase of the economic efficiency of the coal industry on the basis of its fundamental modernization is taking place slowly and does not satisfy the demands of the 27th CPSU Congress and the June (1986) CPSU Central Committee Plenum.

The permanent commissions noted in their decision that the Energy Program is being implemented by the USSR Ministry of the Coal Industry with a lag, while the ministry itself is not ensuring the radical improvement of investment policy and the concentration of resources on the accomplishment of priority tasks.

In the sector proper attention is not being devoted to the replacement of fixed capital (more than half of the mines have not been renovated since 1960), effective monitoring of the increase of the quality of designing is not being ensured, and a drastic lag in capital construction has been allowed. The technical level and reliability of many most important types of machines and equipment, which are being produced, remain extremely low. The mean time

between failures of several of them does not exceed 7 hours (with a standard of 200 hours). The plans of the development of science and technology are systematically not fulfilled, while the development of prototypes of new equipment and technology is frequently dragged out for 10-15 years.

In the decision it is also noted that in recent years in the coal industry the indicators of production efficiency have worsened noticeably--labor productivity and the output-capital ratio have decreased, the production cost of a ton of coal has increased, while this most important sector of the national economy has itself become unprofitable.

The deputies also could not but note in their decision that the executives of the coal industry of the country are not devoting proper attention to the settlement of social questions and to the improvement of the working and living conditions of workers. The plan assignments on the placement into operation of apartment houses, preschool institutions, schools, and various facilities for social, cultural, and personal service purposes are not being fulfilled in the sector.

This is what kind of unattractive picture of the state of the coal industry the deputies, who are members of the permanent energy and science and technology commissions, were forced to state in their decision.

[Question] Only to state?...

[Answer] Of course not. An entire program of specific actions, which are aimed at ensuring the consistent implementation of the basic provisions of the USSR Energy Program and the fulfillment of the assignments of the current five-year plan, is outlined in the decision. The program concerns not only the USSR Ministry of the Coal Industry, but also approximately 10 other union ministries and departments. A number of questions, which require decisions of the USSR Government, were submitted for its consideration.

But we, as I have already said, will return to the checking of the fulfillment of the adopted decision in September of next year.

[Question] Acquaintance with the work of the Permanent Science and Technology Commission convinces one that it is devoting much attention precisely to energy questions. The question of the introduction in industry of new energy-saving technologies and equipment was in the field of view of the commission members. The deputies examined 2 years ago the question of the work of the USSR Ministry of Power and Electrification on the increase of the efficiency of the use of energy capacities and the saving of energy resources. But what energy questions were discussed immediately before the present session of the USSR Supreme Soviet?

[Answer] A meeting of the deputy working group of the Energy Commissions and the Science and Technology Commissions of the Council of the Union and the Council of Nationalities, at which proposals on the intensification in the national economy of the work on energy conservation were discussed, was held on 1 October, on the initiative of Academician Ye.P. Velikhov.

The deputies noted that the progress of the work in energy conservation still does not satisfy the requirements of the 27th party congress. It is being checked, as before, due to the imperfection of the system of planning and management, by the unsatisfactory state of the machine building and instrument making base of energy conservation, as well as little economic interest of the sectors of the national economy.

The permanent commissions addressed to the USSR Council of Ministers the request to commission the State Planning Committee of the country, the Bureau for the Fuel and Power Complex of the USSR Council of Ministers, the State Committee for Science and Technology, and a number of other ministries and departments to perform work on supplementing the already adopted comprehensive goal program on energy conservation with calculations of the investments on each specific assignment with the substantiation of the time of their assimilation with respect to the entire cycle of operations.

Since the introduction of new energy-saving technologies, which lead to the radical decrease of energy expenditures, inevitably involves the radical reorganization of production, while it, as is known, requires time, then, in the opinion of the members of the permanent commissions, at the first stage it is necessary to concentrate efforts on the extensive use of secondary energy resources in industry and housing and municipal services, the rationalization of the systems of electric power supply and electrical engineering devices, the development and improvement of instruments of the monitoring, regulation, and recording of the consumption of fuel and energy resources, as well as the decrease of the rates of consumption of fuel and energy. In other words, we should give priority to the intersectorial directions of energy conservation, which do not require considerable capital investments.

At this meeting it was also proposed to consider the question of the establishment of the new Energosnabzheniye Interbranch Scientific Technical Complex.

[Question] How was the proposal on the necessity of organizing this interbranch scientific technical complex substantiated?

[Answer] First of all by the intersectorial nature of the very problems of energy conservation. For here the implementation of stage-by-stage energy conservation and the pursuit of a unified technology policy, which eliminates disruptions in the cycle of energy-saving measures, are absolutely necessary. Another intersectorial task is the development, assimilation, and introduction of energy-saving equipment and instruments. The questions of the elaboration of an economic mechanism of the management of energy conservation are also far from unimportant. They, as you understand, are also intersectorial.

[Question] What will the Energosnabzheniye Interbranch Scientific Complex be like?

[Answer] I believe that it is premature to ask such a question. It is a matter for the present only of our suggestions. The deputies believe that this interbranch scientific technical complex can consist of a main center and regional engineering centers.

In the main center, in our opinion, it is necessary to include the Scientific Research Institute of Energy-Saving Systems, which has been organized within the Physical Technical Problems of Power Engineering Department of the USSR Academy of Sciences, the Special Design Bureau of Energy-Saving Systems and Equipment with a pilot plant, as well as the Special Design and Technological Bureau of Production Lines for the Production of Energy-Saving Systems and Their Elements with a pilot and series-producing plant. Simple considerations convince us that, along with the USSR Academy of Sciences, the Ministry of Power Machine Building, the Ministry of Chemical and Petroleum Machine Building, the Ministry of the Electrical Equipment Industry, and the Ministry of Instrument Making, Automation Equipment, and Control Systems should be the founders of the main center.

But the "attachment" (jointly with sectorial design institutes) of energy-saving systems to the needs of the energy-consuming ministries and entire regions, the organization of the series output of both the systems themselves and their elements at machine building and instrument making plants, as well as author's supervision of the installation and start-up would be the task of the engineering centers. And another two mandatory functions of the engineering centers are complete service in the process of the operation of energy-saving systems and the training of attendants.

[Question] The new organization is additional capital investments, resources, and staffs. But how many years will one have to wait for a real return?

[Answer] First, I would like to recall that "only nothing comes from nothing." Second, in this case you are entirely incorrect, since the authors of the plan of the Energosnabzheniye Interbranch Scientific Complex believe that only self-sufficiency should be the basis of its work, and credit should be the form of financing.

Credit should be made available for each energy-saving program as a whole and take into account the expenses of all the coperformers. But it is necessary to substantiate these expenses with a calculation of the real saving of fuel and energy resources.

[Question] Who will receive and spend the credits?

[Answer] Only the client of the energy-saving program, that is, the energy-consuming ministry. And it will do this only in accordance with direct contracts with the coperformers of the specific program.

And the saving of expenditures on fuel and energy--the value of the unclaimed amount as against the planned amount--should be the only source of repayment of such credit. It is planned that the entire saving is left at the disposal of the enterprises and is spent, in addition to the repayment of credit, on the payment of bonuses. It is also presumed that the initial level of the planned expenditures on fuel and energy should be retained for each energy-saving technology--during its pay back period. Only a change of the production volume and the level of prices can be the basis for any recalculations.

I will add that the efficiency of the proposed mechanism of ensuring the self-sufficiency of energy-saving programs, the unity of the economic interests of the coperformers, and the interest of labor collectives in the saving of energy resources will increase substantially after the long urgent bringing of the wholesale prices for fuel in line with the actual national economic expenditures.

But I will repeat once again. What was said by me above is merely a paraphrase of the "design of life" of the future interbranch scientific technical complex, which, as we all understand, for the present is far from perfection.

[Question] And, Igor Alekseyevich, my final question. It will, perhaps, seem inappropriate now, when in the press there are so many critical statements, but nevertheless: Are you satisfied with the work of the Permanent Science and Technology Commission of the Council of the Union?

[Answer] I hope that you ask the question not so that I could praise the commission members and, thereby, myself as its chairman.

Of course, I am satisfied that for the assurance of the comprehensive and thorough study and examination of the questions, which are envisaged by the plans of work of our commission, we have learned to unite our efforts with the commission by the same name of the Council of Nationalities, which Academician V.A. Kotelnikov heads, and to coordinate our efforts with the permanent energy commissions of both chambers, as well as with a large number of other permanent commissions. We have established joint deputy preparatory commissions and have enlisted in their work the best and most skilled staff members of state organs, public organizations, and scientific institutions. I am also satisfied with the fact that the recommendations and proposals of our commission were regularly considered in the collegiums of ministries and departments and the corresponding orders and decrees were promulgated in accordance with them.

But take the same question about the work of the USSR Ministry of the Coal Industry, which you and I examined in such detail. Did someone really prohibit--and who can prohibit the deputies of the USSR Supreme Soviet--from posing it 2-3 years ago? For it probably would have been possible to correct very much back during the years of the past five-year plan. We can blame only ourselves for this--for the lack of proper initiative and persistence. But did the problems of energy conservation really arise only in 1984, when we examined the work of the USSR Ministry of Power and Electrification? They have been urgent for at least two five-year plans in a row. But why have we thus far not discussed the problems of increasing the efficiency of academic and especially sectorial science? Once again, there is no one to make responsible except for ourselves.

And, of course, we have not always been consistent in checking the fulfillment of our recommendations and proposals. Some bureaucrats have learned to write such "intricate" documents with an enormous number of references to the most diverse documents and mandatory "objective" conditions that one automatically

loses heart: time, persistence, expert opinions of specialists...are needed for refutation.

Openness is the means to increasing the efficiency of all our work. Without it there are no and can be no democratism, political creativity of the masses, and their participation in management. And moreover--as was noted at the 27th party congress--those, who have become accustomed to working in a slipshod manner and of engaging in window dressing, are truly uncomfortable in the light of openness, when everything that is done in the state and society is under the control of the people and in the eye of the people.

And I would like to believe that we justify the confidence of our electorate, if each of us, the members of the Permanent Science and Technology Commission, to the full extent of our ability will contribute to the accomplishment of this most important state task.

Glebov Biography

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 22, 18 Nov-1 Dec 86 p 5

[Article]

[Text] Academician I.A. Glebov is a Hero of Socialist Labor, USSR State Prize winner, a well-known Soviet scientist in the field of electrical machine building, and one of the developers of the unique KTG-20 cryogenic turbogenerator.

Another sphere of the scientific interests of I.A. Glebov is the fundamental questions of the development of electrophysics and electric power engineering. He is also dealing with the engineering problems which are connected with the development of a new generation of experimental thermonuclear plants.

At the same time as research activity I.A. Glebov for many years has been performing much scientific organizational work.

He is in charge of the All-Union Scientific Research Institute of Electrical Machine Building, where he covered the path from junior scientific associate to director of the institute.

Since the formation of the Leningrad Scientific Center of the USSR Academy of Sciences Academician I.A. Glebov has been the chairman of its presidium. He is also the scientific supervisor of the Intensification-90 Program. For the past 7 years Deputy I.A. Glebov has been in charge of the Permanent Science and Technology Commission of the USSR Supreme Soviet.

Abundant experience in organizational activity, a diversity of scientific interests, efficiency, the ability to listen in a well-disposed manner to

different, at times mutually exclusive points of view and to make the optimum decision--these are the basic traits of the personality and style of work of Igor Alekseyevich.

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REORGANIZATION IN SPHERE OF SCIENTIFIC SERVICE

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 21, 4-17 Nov 86 p 4

[Article by Doctor of Economic Sciences G. Dobrov, manager of the Center of Research on the Scientific and Technical Potential and the History of Science of the Ukrainian SSR Academy of Sciences (Kiev): "Into the Future Without Intermissions"; capitalized passages published in boldface; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] The debate about the basic directions of the reorganization of scientific activity, which was begun in one of our recent issues (NTR, No 18), attracted the attention of many readers. The editorial board has already received tens of responses to the statements of Candidate of Physical Mathematical Sciences S. Khaytun and Corresponding Member of the USSR Academy of Sciences V. Makarov. The stands voiced by them are criticized, supported, and supplemented. But the primary thing is that the framework of the debate is constantly expanding, confirming the urgency of the posed questions. The improvement of the organizational structure, the perfection of the mechanism of instruction, questions of the evaluation of the results of scientific activity, the choice of the priority directions of research, the role and importance of the science of science, the general dynamics of science--this is only a portion of the questions which were touched upon in the letters to the editor. Numerous problems of the training of the new generation of researchers and the arrangement of people in the system of "scientific production" not in accordance with degrees and titles, but in accordance with talent, in accordance with the ability to accomplish rapidly and effectively the most important scientific and technical tasks are also discussed extensively. Today we are submitting several of the received letters to the verdict of the readers.

It is well known that special intermissions are not announced for the preparation for the future in science. Owing to this the requirement of the dynamic growth of the problem-oriented properties of the potential of science is mandatory for all levels of its organization.

The scientific activity, and only the scientific activity, in the process of which each scientific work yields two types of mandatory end results, can count on stably high efficiency. This is first of all the growth of new knowledge and the innovations, which have been prepared for further use, as

well as the increase of the readiness of the scientific and technical potential for the solution of the problems which will be raised in the future.

The recognition of these requirements at all levels--from individual studies to the unified state science and technology policy--should become one of the essential traits of reorganization in Soviet science.

Hence, it is necessary to intensify the work on the formation of systems of scientific and technical priorities. While it is necessary by means of it to regularly define more precisely the type of not only sectorial, but also territorial specialization of the scientific centers of the country.

In order to increase the innovative mobility and timely readiness of Soviet science for the solution of high priority problems at the highest world level, it is necessary already in the next 7-8 years to accomplish in essence the complete technological retooling of the instrument and pilot experimental base of science and to form on the scale of the country a regional network of institutions of the material and technical supply of science, machine service, and collective-use laboratory, computer, and production centers. This problem has already been repeatedly raised, but for the present, unfortunately, sufficiently appreciable results from the actions of the State Planning Committee, the State Committee for Material and Technical Supply, and the State Committee for Science and Technology are not being observed here.

Reorganization in science is an especially complex and profound process owing to the specific nature of the human factor which operates here. The words recently spoken by M.S. Gorbachev with regard to reorganization apply to the community of people of science in particular: "This is a genuine revolution in the entire system of relations in society, in the minds and hearts of people, the psychology and understanding of the present period and first of all the tasks, to which rapid scientific and technical progress has given rise."

Let us note the demands on the dynamism of the creative thinking and the updating of the knowledge of figures of science, which have changed fundamentally in our times. In past centuries and even at the beginning of our century several generations of natural scientists, which had succeeded each other, were able to profess the same scientific ideas. Now a scientist in a 40-year period of his creative life has to retrain himself fundamentally and update the problems and methods of his work three to five times. If, of course, he wants to remain in the leading positions in science.

The increase of the MANAGEMENT skills of scientists and specialists is especially urgent. For one in four or five of them is at the same time also an organizer of work. In this sense management in science is the most widespread occupation. Moreover, the only one which is performed nearly without any special training.

A system for the improvement of the skills of management personnel of scientific organizations has been operating effectively for 3 years now at the Ukrainian SSR Academy of Sciences. All the deputy directors of scientific research institutes for scientific work and a group of young scientists from

the reserve of organizers of science have undergone training here (in accordance with a mixed arrangement: 3 months by correspondence and 7-10 days with leave from work). The effectiveness of such training for the solution of new problems (the assurance of the universal computer literacy of leading scientists, the changeover to new systems of stimulation, the spread of cost accounting forms of scientific service, and others) convinced the Presidium of the Ukrainian SSR Academy of Sciences of the need to establish in the system of the academy a special institute for the improvement of skills. And they have already begun its organization.

The science of science research, which was performed by us jointly with foreign colleagues in accordance with the UNESCO project "The Effectiveness of Scientific Groups," revealed a curious regularity of the activity of scientific collectives, which elaborate for a long time by the same methods an invariable scientific problem.

At first the indicators of the collective, as a rule, are lower than the average statistical indicators. At this time attempts to correct the state of affairs by "heavy duty pressure"--the increase of the number of personnel--are usually observed. This is an erroneous technique. The results, which have been confirmed by the experience of many countries, testify to the existence for different types of research of some rational size of the group--the internationally accepted concept "dozen collectives" even exists. Groups of up to 12 people consume only a fourth of all the resources of science, but provide three-fourths of all its results!

The collectives, which have found their way in science, usually achieve the peak of their effectiveness with respect to groups of a similar type in the 4th to 5th year of activity. In the next few years the greatest level of the applied return for the given collective is also observed. But such a "situation of success" is fraught with the danger of the canonization of the selected approaches. This--in the absence of fundamentally new ideas and invariable problems--gives rise in the 7th to 8th year of work to a tactic which is known by the name "thematic running in place," when the effectiveness of the group is close to the average level.

At precisely such a moment one should reorient or even reorganize the research collective which in the recent past demonstrated appreciable results. But it is unusually difficult to do such a thing. For the pointedly formulated "great law of chemistry": "it is easier to discover a new chemical element than to close an old chemical laboratory," exists far from by chance.

But maybe it should not be closed at all? A talented organizer and far-sighted manager strive in advance to seek alternate routes in science and to update the arsenal of technology of research--methods, technical means, and forms of the organization of work, which, as practical experience shows, with time can lead the collective to new successes.

Why is this wise tactic of supporting the dynamically high efficiency of research the exception rather than the rule? The inadequate attention to talent and innovation in science, which was pointed out by V. Makarov and S. Khaytun, is undoubtedly among the first causes of this phenomenon.

Let us also indicate several other existing causes and paradoxical situations. In the information supply of science a rule is in effect: the information that exists is not the information that we want to have, the information that we want and order is primarily not the information that we actually need, while the actually necessary information is lacking.

It would not be an exaggeration to assert that in the past decade practically no positive changes have occurred in the scientific information supply of Soviet scientists, while owing to various reasons many, previously available possibilities have been reduced.

In the mass study of the factors of the efficiency of science, which was made by us, it was noted: the greater amount of scientific equipment that is on the balance sheet (per researcher), the lower the satisfaction of collectives with the level of supply of hardware. This, at first glance, paradoxical situation is explained by the fact that those, who do not and did not have modern means of scientific activity, developed for themselves such a technology of it, which eliminates modeling and a complicated experiment, but frequently reduces to the writing of a "new" article or book on the basis of several that have been read. For those, who are striving to work on the front lines of the scientific front and are dynamically updating their problems and methods of research, technical equipment quickly loses its attractiveness, since it ceases to correspond to the new research goals.

In the evaluation of all and any resources of Soviet science it is necessary to resolutely overcome the "accounting-reporting" approach to the evaluations of the scientific and technical potential. It legitimizes the expenditure psychology and the waste of especially valuable resources of the country.

The science policy of our country and the management of specific studies need a problem-oriented approach to the evaluations and the formation of a science-oriented approach to the sector of scientific service.

7807
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QUALITY OF TRAINING, CERTIFICATION OF SCIENTISTS

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 23, 2-15 Dec 86 p 3

[Speech by Doctor of Physical Mathematical Sciences Professor Viktor Grigoryevich Kirillov-Ugryumov, chairman of the USSR Higher Certification Commission, at a meeting of the management of the USSR Higher Certification Commission with journalists, recorded by N. Korneva, under the rubric "Reorganization. What Should It Be Like in Science?" "The Level of Higher Certification"; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] "The quality of training of researchers is a reserve of science," "What should academic degrees be," "What is new in the system of certification of scientists"--these key questions of the activity of the Higher Certification Commission attached to the USSR Council of Ministers were discussed at a recent meeting of its management with journalists. Doctor of Physical Mathematical Sciences Professor V.G. Kirillov-Ugryumov, chairman of the USSR Higher Certification Commission, delivered a report.

"The quality of training of scientists," Viktor Grigoryevich said, "is fundamentally connected with certification. Therefore, in speaking about the reorganization of the work of the system of certification, it is necessary to dwell specially on the type of training of research personnel. A most important part of the work of the Higher Certification Commission: the analysis of the content of completed dissertations, is connected with it. It is necessary for the monitoring of the orientation of the training of scientists. This is important work, the goal of which is to increase the contribution of the Higher Certification Commission to the planning of the training of personnel, first of all in graduate studies.

"Definite experience has already been gained here. Such an analysis made it possible to identify several serious distortions in the training of personnel. For example, the expert council for machine building analyzed the content of dissertations in the specialty 'the machining of metals.' It turned out that an enormous, and to put it more precisely, an excessive number of works on the cutting of metals, which have been completed by graduate students, exist, and at the same time dissertations on advanced technologies--the continuous casting of steel, electrophysical methods of machining, waste-free technologies, and so on--are lacking.

"Of course, analytical work and the discussion by the scientific community and interested ministries and departments of the recommended directions of the themes of graduate student research will help to eliminate such distortions.

"The most different, at times mutually exclusive opinions have been voiced in recent times about academic degrees: from the need for their abolition to the advisability of leaving everything as it is. The opinion that, they say, in our country a person, who has defended a dissertation and received an academic degree, as if receives a life annuity, which makes it possible then not to trouble oneself with scientific work, is encountered most often. But then in the West, ostensibly, people who have defended dissertations do not receive material benefits.

"The latter is simply incorrect. As to the material support of the holders of academic degrees in our country, it is, first, directly linked with specific positions. Second, the conformity to the held position is regularly demonstrated during periodic recertification. And whoever has not demonstrated this, according to the rules, should give up the position. It is another matter that the rules are frequently violated--recertification is carried out formally and ineffectively, but this is already a question of an organizational order.

"A vital theme, which is touched upon in many letters to the Higher Certification Commission, is the question of dissertations as such. They often speak of the fact that these are plump volumes, which no one needs and the inevitable fate of which is to gather dust on shelves.

"I believe that it is appropriate in this connection to turn to the explanatory dictionary of V.I. Dal, according to which a dissertation is a short scientific composition for the purpose of demonstrating one or several scientific assumptions. It must be said that this definition is not in the least obsolete. And in the statute now in effect it is also emphasized that the dissertation writer in addition to all else should demonstrate the ability to set forth his views briefly and logically. The Higher Certification Commission is advancing and encouraging in every way the writing of short, comprehensive, and meaningful dissertations.

"If we speak about the utility of dissertation works, the report obtained at the State Library imeni V.I. Lenin illustrates it well: the coefficient of circulation of dissertations in the special hall of this library comes to 1.5 a year. In the opinion of workers of the library, this is a quite decent circulation of a scientific work, which is comparable to the circulation of a number of scientific journals.

"And all the same is it perhaps possible to do without dissertations? I would answer this question as follows: yesterday this was considerably easier than today. I will cite just one reason. In the conducting of scientific research collectivism is increasing more and more. For example, in the field close to me--experimental physics--tens of people (including administrators, people who support the operation of machines, complex instruments, and others) jointly perform work on the investigation and study of the properties of an elementary particle. But the personal creative element is important for obtaining an

academic degree! And the dissertation makes it possible to single out and illuminate the achievements, which belong to a specific person in science, and to determine the height of his own creative flight. In this sense it is quite difficult and not necessary to replace it with something else.

"Of course, one should welcome in every way new ideas and new conceptions in the organization of certification. The existing system (and this does not cause anyone doubts) is not ideal, but constructive suggestions, which have been checked in practice, and not abstract suggestions, are needed for its improvement. It is difficult, for example, to agree with the opinion about the need for the abolition of the existing two-stage system of the awarding of the academic degrees of candidate and doctor of sciences and to change over to the one-stage system, which ostensibly exists throughout the world. (In reality a one-stage system does not exist throughout the world. In the United States, in addition to the degree of doctor of philosophy, there are the master's degree, the bachelor's degree, and a number of others.) The existence of two academic degrees is also justified because they attest to the different levels of scientific maturity and skill of their holders.

"Everything that has been said does not mean, of course, that there is nothing to improve in the organization of certification. We have already begun the reorganization of the work of the USSR Higher Certification Commission, and we began with the change of the style and methods of work. Our basic shortcoming reduces to the fact that the Higher Certification Commission in its upper echelons--the expert councils, the presidium--in recent times has actually dealt with modifications and corrections of the shortcomings, which were allowed at the initial stage of the examination of the dissertation: at the institutions, where it was written, and in the specialized councils, where it was defended. When receiving a dissertation file with a trivial conclusion of the council on the quality of the submitted work, with remarks left without a response, and with the violation of the regulations of certification, we previously sent the work for private examination. This led to the dragging out of the procedure and, if you call a spade a spade, to red tape, for which they justly criticized us.

"Therefore, the first thing that it is necessary to do is to shift the center of gravity of the work to specialized councils. If the quality of the conclusion and materials of the certification file do not satisfy us, we will not review it, but will return it to the specialized council with specific instructions on what shortcomings should be eliminated. While the question not only of the awarding of the academic degree, but also of the competence of the specialized council, which sends to us unfinished materials, will be examined in the expert council.

"The task is to create a network of councils for the defense of dissertations and the awarding of academic degrees, which is optimum in size and, therefore, manageable. In 8 years we have halted the activity of 24 specialized councils, while in the past 1.5 years we have halted that of another 16, moreover, to a significant degree due to councils which have permitted errors in work and insufficient demandingness.

"By changing the methods of work, we intend to reduce the well-known formalism and to eliminate the completely unjustified 'document turnover.' A procedure, when dissertations, which are at the meeting point of two specialties, required a separate decision of the Higher Certification Commission for defense, existed. The council should have turned to the Higher Certification Commission: it should have written a document and given suggestions on supplementing the staff of the council, which should have sufficient competence to examine a dissertation. Since in a year there are 1,500-2,000 dissertations at the meeting point of sciences, this gave rise to an enormous paper flow. And recently the Presidium of the Higher Certification Commission adopted a decision--to turn over this function to the councils themselves for the settlement of questions of this sort locally. One source of the 'document turnover' in our country dried up. And we believe that in no case did we lose in the quality of the examination of dissertations.

"An essential direction of reorganization is the increase of the prestige of engineering labor. Executives of the party and government have repeatedly spoken about the importance of this work.

"At the end of last year the Presidium of the USSR Higher Certification Commission made the decision to grant the directors of the main sectorial scientific research institutes, the managers of scientific and technical programs, as well as the scientific and technical councils of ministries the right to submit recommendations on the defense of dissertations in the form of a scientific report. This work is being continued--the time has come to specify and broaden the demands, which are made on the seekers of the degree of doctor of sciences and on highly skilled specialists, who are the authors of the principles of advanced technologies and fundamentally new machines, the introduction of which had a substantial influence on scientific and technical progress.

"The establishment of interbranch scientific technical complexes (MNTK's), in particular, should contribute to the increase of the prestige of engineering labor and the strengthening of the plant sector of science (and at present only about 2 percent of the scientists work in industry). Recently the Politburo of the CPSU Central Committee adopted a decree on training personnel at a leading pace for the latest directions of scientific and technical progress. The Higher Certification Commission regards as advisable the establishment at interbranch scientific technical complexes of specialized councils for the defense of dissertations. Here the conclusion of the managers of the interbranch scientific technical complex on the scientific significance of the performed work should at the same time also be the conclusion of the leading organization. That is, for this category of dissertation writers the procedure of defense is being appreciably simplified.

"The extraordinary right of the defense of dissertations will also be granted to degree seekers with works on the themes of the Comprehensive Program of the Acceleration of Scientific and Technical Progress of the CEMA Member Countries.

"Such a problem as the established age qualification of scientists cannot but arouse serious alarm: now only 20 percent of the total number defend candidate dissertations by the age of 30. The average age, at which they defend candidate dissertations, is 37, doctoral dissertations--48. The task is to reduce the age, without decreasing the demands during certification. What is it proposed to do in this direction?

"It is well known how much time of a graduate student is spent on the publication of the results of an already completed scientific work. In order to shorten it, it is proposed to regard as the equivalent of publications of degree seekers, who work in the plant sector of science, reports on the development of technologies, machines, and materials and author's certificates for inventions.

"In case of the defense of a candidate dissertation, especially in the priority directions of science, it is proposed to issue the recommendations of the specialized council on the establishment for the most talented of the young scientists of conditions for the quickest preparation of a doctoral dissertation: this can be creative leaves, enrollment in doctoral studies, and others. It seems that the status of scientific consultant of the doctoral dissertation should also be reestablished, having stipulated the demands on his skills, since doctoral dissertations, as a rule, are defended more often at scientific schools which are headed by outstanding scientists.

"I would like to emphasize," V.G. Kirillov-Ugryumov said in conclusion, "that the Higher Certification Commission regards the critical statements of the press concerning many aspects of the system of the certification of scientists as a manifestation of the increasing role of the system of certification in the scientific, technical, and spiritual progress of the country. They aid the identification of shortcomings in work and their effective elimination, and the primary wishes with regard to criticism in this connection are to be just and constructive criticism, which is permeated by our common concern about the improvement of the matter."

From the Editorial Board

The work on the reorganization of the system of higher certification, and it is necessary to welcome this in every way, has begun. However, judging from the readers' responses, which are being received by the editorial board to the publications under the rubric "Reorganization. What Should It Be Like in Science?", many urgent questions still require settlement.

In the letters to the editors there are not only criticism of the system of higher certification, but also a large number of specific suggestions on the increase of its quality. Many of the letters, in our opinion, can be used in the collective search for directions of the improvement of the activity of the Higher Certification Commission. For this purpose the editorial board intends in the very near future to make a selection of readers' letters available to the management of the Higher Certification Commission.

7807
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NEFTEOTDACHA INTERBRANCH SCIENTIFIC TECHNICAL COMPLEX

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 23, 2-15 Dec 86 p 6

[Article by M.L. Surguchev, director of the Nefteotdacha Interbranch Scientific Technical Complex, recorded by Ye. Minin, under the rubric "The Resources of the Country. The Search for Reserves": "The Nefteotdacha Interbranch Scientific Technical Complex. The First Steps"; first two paragraphs are NTR: PROBLEMY I RESHENIYA introduction]

[Text] "...The time of 'gold gushers,'...and easy petroleum is ending," General Secretary of the CPSU Central Committee M.S. Gorbachev said at a meeting with petroleum industry workers of Siberia.

This objective reality underscores the particular importance of various methods of increasing petroleum recovery. As is known, nearly half of the valuable hydrocarbon raw material remains under the ground in old, exhausted petroleum provinces. The Nefteotdacha Interbranch Scientific Technical Complex is also called upon to deal with new intensive methods of recovery. M.L. Surguchev, its general director, gives an account.

Nearly every year we learn about the discovery of additional petroleum reserves in our country. Why is there such attention to the yield of old deposits? Is it not easier to develop new ones?

Yes, the petroleum reserves on the territory of the USSR are great. Geologists, having equipped themselves with modern methods of prospecting, actually are discovering new deposits. But look at the geography of these new discoveries! Siberia, the North, deserts, and semideserts.

Enormous distances. Uninhabited regions. The lack of an industrial base. It is necessary to deliver extracting equipment here. It is necessary to transport the petroleum from here to the sites of its refining or to build petroleum refining enterprises in hard to reach regions. Already today at many recovery sites people are working by the work shift method, that is, with great expenditures a large number of workers are constantly spreading over the entire territory of the union.

The extensive method of the recovery of petroleum--the most valuable raw material for petrochemistry and the obtaining of fuel--due to just the development of new reserves is turning into a too expensive pleasure.

That is why the question--did we not abandon too soon the old, already developed petroleum provinces of the country?--is also becoming such an urgent one.

After all, up to half, or else more of the petroleum discovered in the ground remains in the deposits which we customarily call "depleted." And often, taking into account the high cost of petroleum of new regions, the use of intensive, even expensive technologies of increasing petroleum recovery prove to be economically more advisable.

Before proceeding directly to the methods of increasing the yield of petroleum from the formation, it is probably worth saying a few words about the basic causes of the natural decrease of the flow rate of wells.

The point is that in petroleum there are such compounds as paraffins, resins, asphaltenes, and others, which can settle in the small pores of the formation, decreasing their effective cross-section. But a petroleum-bearing formation is also precisely a labyrinth of capillary channels and fractures. With time their flow capacity decreases. The internal formation pressure also drops. The well yields less petroleum.

A large number of methods have been developed to restore the flow rate of the well and even to increase it. The first and simplest one is to increase the internal formation pressure. For this water or gas, which also create an additional head, is fed under pressure into the formation.

It is also possible to effect more directly the viscosity of the petroleum, which in turn depends on the temperature. By increasing it, we decrease the viscosity and increase the yield of petroleum. Therefore, if instead of water superheated steam is injected into the formation, the impact will be much greater.

But petroleum itself can also burn, moreover, with a great release of heat. Hence, if a sufficient amount of oxidant is fed into the formation and the petroleum is ignited, its viscosity will decrease and the necessary impact will be achieved, true, at the expense of the loss of a certain quantity of the product being extracted.

If we also mention the means, which reduce and dissolve various kinds of sediments in the pores and fractures of the formation, it is possible to consider that first acquaintance with the methods of increasing petroleum recovery has been made.

Even such a superficial survey makes it possible to understand: the entire set of tasks on the sharp increase of the recovery of hydrocarbon raw material cannot be solved by the efforts of some one ministry or department. Powerful pumping and compressor stations, which are capable of pumping liquids and gases at temperatures of 300-400 degrees Celsius and higher, mobile and

stationary steam generators, various chemical means of stimulating the formation and the critical zone--all this is being developed and produced in various sectors.

We want to know how the indicators of the product being extracted change after its exposure to one intensive method or another. For the properties of the compounds, which are obtained after the refining of the petroleum, that is, the quality of the final product, depend on this. Hence, it is necessary to extensively develop basic research on the study of the physical chemical properties of petroleum and formations. Only by means of such research will we be able to act, as they say, with open eyes, using the latest methods profitably for the matter.

The idea of organizing the Nefteotdacha Interbranch Scientific Technical Complex--a specialized scientific technical complex, which unites the efforts of many sectors of the national economy for the accomplishment of the common task of providing the country with the necessary quantity of hydrocarbon raw materials--thus emerged. An idea which is now being implemented.

Enterprises of the Ministry of the Petroleum Industry and the ministries of machine building, the petrochemical and chemical industries, fuel and power machine building, and instrument making were included in our interbranch scientific technical complex. The All-Union Scientific Research Institute of Petroleum and Gas became the main organization. More than 1,000 of its staff members work in Moscow. Moreover, a combined division is located in Bugulma, where the production base--a pilot plant for the production of physical means of increasing petroleum recovery--is being built. There they will make fittings for wells, the wellhead, and the bottom hole. We plan to place the plant into operation in 1988-1989.

Three scientific production associations of the Ministry of the Petroleum Industry also belong to the nucleus of the interbranch scientific technical complex. The largest of them is the Krasnodar Soyuztermneft Scientific Production Association. In its scientific design section alone 1,200 staff members are employed, and about 7,000 more people work at the pilot works. The pilot bases of this association have a broad geography: the coast of the Black Sea, Kazakhstan, the Komi ASSR. The basic task of the scientific production association is the testing and introduction of new technologies and material and technical means of increasing petroleum recovery.

The Kazan Soyuznefteprom khim Scientific Production Association (2,000 staff members) is busy with questions of the synthesis of chemical products as applied to specific deposits. It produces chemical means of controlling deposits of paraffins and salts in formations and the corrosion of oil-drilling equipment. The scientific planning personnel of the scientific production association have close contacts with territorial production associations and bases of chemicalization. They are located, of course, at the sites of petroleum production--Tataria, Siberia, Perm Oblast, Kazakhstan. Such "attachment" is not by chance: each deposit subject to the specific conditions needs its own set of chemical products and its own compositions.

And, finally, the Soyuznefteotdacha Association, the youngest association, is located in Ufa. For the present here the concerns of the new settlers are: construction, materials, deadlines. But, when they get on their feet, the gas (hydrocarbons, nitrogen, carbon dioxide, and others) methods of increasing petroleum recovery will be included in the sphere of their interests.

The remaining organizations, which will be spoken about, are not directly linked with the Ministry of the Petroleum Industry. These are our partners from other departments. Their inclusion in the interbranch scientific technical complex is explained by the traditional and functional predilection for the themes of petroleum recovery.

I will begin with the most active elaborators of our problem. The field of the Institute of High Temperatures of the USSR Academy of Sciences is the development of technical means of thermal formation stimulation. These are first of all bottom-hole steam generators and heaters, which we need so much. Here they are elaborating the theory of heat transfer in formations and a number of other thermal physics problems. Within the walls of the institute about 200 people are working on our themes. Interaction with them is stipulated by a joint program which is intended for 5 years.

The All-Union Scientific Research Institute of Surfactants, which is subordinate to the Ministry of the Petroleum Refining and Petrochemical Industry and is located in Belgorod Oblast, is giving us much help. This is a polytechnical institute, at which about 70 people are dealing with our problems.

The obvious lack of knowledge about the behavior of petroleum in formations makes it incumbent to devote much attention to contacts with academic science. Unfortunately, the subdivisions, which are making contact with us at the corresponding institutes, are very small. For example, at the Institute of Hydrodynamics of the Siberian Department of the USSR Academy of Sciences (Novosibirsk) only a small (just 10 people) department is dealing with the basic tasks of using hydrodynamic and physical chemical methods of increasing petroleum recovery.

The group at the Institute of Physical Chemistry of the USSR Academy of Sciences, which within the framework of our problems is working on theoretical questions of microemulsion systems, is also small.

From the Ministry of Chemical Machine Building the VNIIneftemash, which should develop equipment for increasing the petroleum recovery of formations, is included in the interbranch scientific technical complex. It is simply not accomplishing its tasks, and its functions will have to be turned over, apparently, to the Kazan TatNIIneftemash.

We are seeking--and not without success--new contacts with scientists of the most different specialties. For example, we have begun to cooperate with the institutes of chemical physics and microbiology of the USSR Academy of Sciences. But these contacts have not been officially formalized, and for the present only groups of three-five staff members each are helping us.

At the same time very much assistance from science is possible. For example, scientists of the Tomsk Institute of Petroleum Chemistry proposed a promising composition which is based on alkaline solutions with surfactants (surfactants which do not form ions). Now at the Sovetskoye and Strizhevskoye deposits of Western Siberia we are performing a large-scale test of them.

The interbranch scientific technical complex is a new matter, which for the present is still not adequately organized. Of course, our complex, like the others, is overcoming the difficulties of a trail blazer. Here there are the questions of interrelations with enterprises of different subordination, financing, and the prospects of planning and stimulation.

Take if only the question of finances. Until the end of 1986 we, while already being an interbranch scientific technical complex, will remain merely coordinators of the work on the problem, since we do not have in our hands the most effective--financial--levers. Starting in 1987 in conformity with the statute on the interbranch scientific technical complex, we should receive assets for the development of petroleum recovery. But how? From the State Committee for Science and Technology through ministries. The interbranch scientific technical complex will redistribute the assets obtained in this manner among the organizations, that is, will send them back to the sectors. Is this means not too complicated?

For the present the mechanism of interaction among the units of the interbranch scientific technical complex, especially if they are of another departmental subordination--not to the Ministry of the Petroleum Industry--is also far from developed. First of all this pertains to academic institutes. But, as I have already said, we are assigning a special role to basic research.

And, of course, it is necessary to develop a technology of introducing new achievements of science into practice. This is the most critical and difficult stage of the activity of the interbranch scientific technical complex, for the sake of which it, strictly speaking, was also established.

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ACCELERATION OF UZBEK SCIENTIFIC, TECHNICAL PROGRESS

Tashkent ZVEZDA VOSTOKA in Russian No 7, Jul 86 pp 125-132

[Article by I. Munayev and A. Sileyenkov under the rubric "The 12th Five-Year Plan in Action": "In the General Direction"]

[Text] The Tashkent Experimental Design Bureau for the Development of Means of Mechanization of the Packaging and Wrapping of Finished Products is the best in the system of the ministry. The technical level of its items corresponds to the world models, and in many cases also surpasses them.

"We are closely linked with the leading related organizations of the CEMA member countries, and our friends believe that in Tashkent there is something for them to learn," says Pavel Fedorovich Kulichenkov, director of the experimental design bureau. "I will say by the way that two foreign firms paid $15,000 just to inspect our automatic units."

For two five-year plans in a row the collective of the experimental design bureau has been working under the motto "Not One Development Without an Invention," which gives extensive freedom for the creative initiative of specialists.

The products of the experimental design bureau are deservedly in great demand among chemists of the country. We visited the largest enterprise of the republic--the Chirchik Elektrokhimprom Production Association, where the Temp automatic line, which was developed in Tashkent, has been operating for a number of years.

"After the purchase of the Temp line," related A. Mirzakarimov, chief of the carbamide shop, "labor productivity in packaging operations increased by threefold. We previously packaged carbamide for retail trade by hand. We ask very much for a few more of these units...."

Unfortunately, for the present there are only a handful of them. For the experimental design bureau is not a plant, it can produce only prototypes. But the Temp line could replace thousands of workers in the packaging of products in trade and at enterprises of the food and local industry and could sharply increase labor productivity in modern flow-line production. However,

economic managers are not displaying an interest in the new equipment and are not raising the question of its mass production.

Pavel Fedorovich was obviously troubled by something. Throughout our conversation he carefully concealed his emotions, but toward the end broke down:

"Why they also do not want to build everything.... It was necessary to go to the city committee to complain. But what is to be done? Of the 700,00 rubles Trust No 6 of the republic Ministry of Construction has assimilated a pitiful amount. You see, it is unprofitable for them to work at small projects, give them giants in the hundreds of millions of rubles, then they will show what they can do--both the bonuses will be large and the wage is high...."

Kulichenkov fell silent, expectantly looked at the people he was taking to, but could no longer stop:

"Do you understand what is happening? In the republic there are about 500 planning and design organizations. Many are operating inefficiently. Why? There is no sound pilot experimental base. It is difficult, almost impossible to create it on one's own, small projects like ours are unprofitable for construction workers, state interests do not concern them. But such design bureaus for their most part also determine scientific and technical progress in various sectors of the national economy. Although our experimental design bureau yields annually a net profit of 1 million rubles, it could, after all, yield significantly more, if we had a pilot experimental plant. It is clear to every technical manager that in crude workshops it is impossible to develop new models of equipment of the world level. Impossible! Do you understand? Well, what would you order me to do in this situation? Go again to a reception?"

And Pavel Fedorovich will go, will prove that he is right, and will "beat out" his object. But how much effort, energy, patience, and persistence this will require. Is everyone capable of shouldering such a burden, of agreeing to take risks, and of entering into conflicts with partners in a common cause? We have quite a few such managers, who prefer to sit it out behind the armor of official offices, to listen submissively to criticism with regard to the low practical return of the organizations entrusted to them, and to cite objective reasons as justification of their passive position. Without initiative, daring outbursts, and the constant expenditure of human energy it is impossible to accomplish major changes in technical progress. From the energy of the word to the energy of the deed! Today there can be no concessions to inertia. Time is opening the way for new ideas, new machines and technology, and this means to creative, bold, determined people.

But what if a truly creative person, who is capable of advancing a bold scientific idea and of developing it, does not have "penetrating" capabilities? What then? Is the idea doomed?

In order to give scientific and technical progress genuine acceleration, the thorough reform of planning and management and of the entire economic mechanism is necessary. It is necessary to create such conditions so that

original scientific developments would literally be snatched out of the hands of scientists. But this means that our economy should become most receptive to scientific and technical progress, so that a vital interest in it would emerge in all units of the national economy. That is how the party is posing the task.

For the present our economy is indifferent to the achievements of science and technology. If only the following fact attests to this: last year of the 79 ministries and departments of the Uzbek SSR in more than 60 the plans on scientific and technical progress were upset. And as a whole for the republic the assignments on the introduction of new equipment and advanced technologies from year to year are not fulfilled.

The intensification of production requires the sharp expansion of the scale of retooling and renovation. According to the data of economists, of the 500 large enterprises of the republic more than 300 need radical technical improvement. Among them are enterprises of ferrous and nonferrous metallurgy, electrical equipment plants and combines, the majority of machine building plants and combines, chemical plants and combines, and nearly all the plants and combines of construction materials. At the same time at the enterprises of the Ministry of Ferrous Metallurgy and the Ministry of Mineral Fertilizer Production the share of the assets being allocated for renovation and retooling during the past two five-year plans came to 5-12 percent, the Ministry of the Gas Industry--3-4 percent, the Ministry of the Construction Materials Industry--11-12 percent. Even in Tashkent, the industrial and scientific capital of the republic, more than half of the forge and press, materials handling, and other equipment is obsolete, at the same time the coefficient of the replacement of fixed capital is decreasing. The lag in the retooling of production if only by a year, even by a month, can turn into irreplaceable losses for the state.

The time of the passage of a scientific idea into the practice of the national economy is estimated at best at 5 years. Half of the scientific developments, as President of the Uzbek SSR Academy of Sciences P.K. Khabibulayev noted, are not used at all. In particular, scientists developed a technology of producing cement from a waste product of chemical plants--phosphogypsum. Tens of millions of tons of it have accumulated on the territory of the republic. How much first-class construction material it would be possible to obtain from this waste! However, the practical use of phosphogypsum amounts to only a tenth of a percent.

Another development of scientists on the use of a waste product of the hydrolytic process--lignin--also has no better a fate. Its introduction would make it possible to increase the fertility of soils on tens of thousands of hectares and to additionally obtain due to the increase of the yield of agricultural crops a revenue of about 7 million rubles.

The Institute of Microbiology 15 years ago offered recommendations on the use of chlorella for livestock fodder, their great effectiveness was practically demonstrated. It would seem that under the conditions of the shortage of fodder protein production workers would jump at this idea, but alas....

And it is possible to cite many such examples.

Indeed, when people speak about the problems of introduction, as a rule, they address a large portion of the reproaches to production, accusing it of sluggishness and conservatism. However, life also demonstrates another thing: production workers frequently have countercomplaints--especially about the quality of scientific developments. Only 40 of the 180 scientific research institutes are introducing completed, thoroughly worked out ideas.

Farmers of the republic have been waiting tens of years for a new cotton harvester: the ones available today are extremely imperfect, they not only do not ensure the complete harvesting of cotton, but also worsen the quality of the fiber. And as a consequence thousands of city dwellers annually go to the cotton fields, offsetting by their labor the imperfections of these machines. What enormous harm is being done to the state economy!

It is impossible to say that work is not being performed in this direction: hundreds of doctors and candidates of sciences and highly skilled specialists are developing new equipment. Public money is flowing like a river, thick volumes of scientific reports are being sent by conveyer to the shelves, but in the past 30(!) years a fundamentally new technical solution has never been found.

A powerful scientific and technical potential has been created in the republic. More than 80,000 people are employed in the sphere of scientific research on the development of new equipment and advanced technologies. Annually the expenditures on science come to tens of millions of rubles. At the same time due to the inadequate coordination of research, duplication and parallelism, and weak contact with practice more than a third of the scientific organizations are not yielding the proper result.

The time has come to look in a new way at the old problems. New approaches to their solution and, consequently, the thorough reform of the established forms and methods of work both in science and in production are needed.

"Calculations show," M.S. Gorbachev emphasizes, "that if we also ensure in the future the outlined increase of the national income on the former, to a significant extent extensive basis, for this it will be necessary every five-year plan to increase the extraction of fuel and raw materials by 10-15 percent and the amount of capital investments by 30-40 percent and to involve in the national economy an additional 8-10 million people. But we simply do not have such possibilities." That is why the task of turning science into a productive force of society has been set for scientists. However, the current system of the management of scientific and technical progress often does not work, and the most valuable proposals die on the shelves.

Pain and indignation are heard in the voice of Sunnat Ibragimovich Ibragimov, director of the NIIStromproyekt, when he speaks about the poor use of a most valuable development which has been recognized as a discovery--a new technology of obtaining low-temperature cement. (The discovery was made by a group of scientists headed by Doctor of Technical Sciences B.I. Nudelman.)

"Alinite cement," S.I. Ibragimov relates, "is produced in accordance with a low-temperature saline technology from the same raw materials as ordinary cement. With the sole difference that here 25 percent of the fuel and about 30 percent of the electric power are saved, the productivity of the units increases sharply; our cement is much stronger than ordinary cement, therefore, significantly less of it is required for the production of concrete. What is also very important, it sets and hardens at a temperature of both -50 and +50 degrees. If it were possible to organize the mass production of such cement, the state would obtain an enormous economic gain. Our institute also designed a pilot experimental plant for the production of alinite cement, in 1980 it was started up in Akhangaran, but.... Imagine, our discovery has been patented in the United States, Japan, and France, they are using it, but we cannot! The reasons, at first glance, although minor, proved to be insurmountable. The people of Akhangaran are receiving the calcium chloride, which is necessary in production, from the Donbass. Of course, it is far, to its disadvantage, and, what is the main thing, too little for the organization of a smooth process. But a way out was found. Scientists of the Tashkent Affiliation of the All-Union Scientific Research Institute of Water Supply, Sewerage, Hydraulic Structures, and Engineering Hydrogeology proposed to obtain calcium chloride by the appropriate processing of the waste water of thermal electric power plants. The cement workers in this case will receive the product they need, a local, inexpensive product; the power workers will abandon the delivery of sodium chloride, with which they purify discharges; finally, the environment will also gain--the pollution of the water basin of the republic with the waste water of thermal electric power plants will cease. The obviousness of such a universal gain, however, did not inspire the republic Ministry of Power and Electrification: it recognizes the value of the scientific development, but is not taking practical steps for its introduction."

The USSR Ministry of the Construction Materials Industry made the decision to begin the production of alinite cement on one of the four production lines in Akhangaran. However, the Uzbekshakhtostroy Trust is upsetting with impunity all the deadlines of the fulfillment of the construction work.

The lack of organization and irresponsibility are the corrosion which is eating away the vital creative matter. Today the party is calling for the sweeping away of the conciliatory psychology and narrowness of the economic thinking of a specific category of managers. Here it is necessary to understand the need for the accomplishment of the most difficult sociopsychological task, which is closely interconnected with the problems of the development of science, technology, the economy, and policy.

"Departmental isolation is doing enormous harm to the vital creative matter," President of the Uzbek SSR Academy of Sciences P.K. Khabibulayev asserts. "This is a dangerous disease of scientific and technical progress. That is why, while having an enormous potential, we cannot use it for the good of society. The majority of developments, being at the junction of several sectors, can be successfully introduced only on the condition of equal interest and joint efforts."

Moreover, given the existing evaluation of the activity of industrial enterprises economic managers are not in much of a hurry to introduce the achievements of science: this requires the diversion of engineering and technical personnel, materials resources, and finances, which, as a rule, are extremely necessary for the fulfillment of the basic production program. The problem of introduction is the problem of the overcoming of the conflicts between the scientists, who advanced the new idea, and the director of the plan, who legitimately does not want to agree to taking risks.

There is also no proper interest on the part of scientists in the implementation of their own developments. In recent times the following stand has appeared more and more distinctly: we have done our job, let others do the thinking further.

"Such an understanding of the task," D.A. Musayev, chief scientific secretary of the Uzbek SSR Academy of Sciences, said, "has done great harm to the development of scientific and technical progress. An analysis has shown that it is impossible to introduce a large percentage of the ostensibly completed works in production for various reasons: the design is no technologically feasible, there are no technical and economic documents, and so on. A kind of vacuum, which has been filled with an enormous number of dissertations, has formed between science and production. From the standpoint of a specific economic system this is money cast to the wind. Such luxury borders on gross mismanagement. The specific contribution to the national economy should be the main criterion in the evaluation of the labor of each scientist."

For many years the scientific subdivisions of the republic have been dealing with the question of the use in the national economy of the stems of cotton plants--guza-paya. Tens of diverse technologies of obtaining valuable high-quality products have been developed.

"From guza-paya it is possible to obtain alcohol, furfuryl alcohol, and nutrient yeast, from its briquets--fiberboard.... Industrial tests will be started in 1986," S.T. Tashpulatov, director of the Scientific Research Institute of the Chemistry and Technology of Cotton Cellulose, said.

Let us add to what has been said that in the quarter century of work of the institute on this problem we have heard the like many time and has seen on the stands of the institute samples of diverse products made from guza-paya, but to date it is being plowed into the ground. The specially formulated comprehensive scientific and technical program on the use of guza-paya in production, of which S.T. Tashpulatov was appointed supervisor, has also not changed the situation. Something has been done, a machine for the harvesting of cotton stems was even developed at the Central Asian Institute of the Mechanization and Electrification of Agriculture. But each section of the program was simply left alone with its results: a complex was not obtained! The program turned out not to be fulfilled.

The advanced experience of the country shows that intersectorial problems are successfully solved precisely within comprehensive scientific and technical programs, but thoroughly thought out and competently planned ones! This is a fundamentally new form of the acceleration of scientific and technical

progress. During the 10th Five-Year Plan there were formulated in the republic 13 such programs, each of which pursued the main goal: to unite the efforts of scientists and production workers, to concentrate material and technical resources on the accomplishment of major national economic tasks, and to ensure in the end the shortening of the time of the complete introduction of scientific ideas.

The final stage of the implementation of comprehensive programs is the obtaining of the final product: machine tools, mechanisms, preparations, types of items.

Programs were formulated on the basis of proposals of the republic Academy of Sciences, the Central Asian Department of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin, ministries, and departments.

Indeed, attention was focused on major national economic problems, such as: the increase of the level of mechanization in cotton growing, in particular, the development of a fundamentally new general-purpose cotton harvester; the efficient use of natural raw material resources and environmental protection; the improvement of the management of the national economy on the basis of the use of computer hardware. Especially many hopes were placed in the program of the practical application of solar energy.

However, life harshly rejected the not completely worked out ideas of scientists: the buildings put into operation, in which heating with the use of solar energy was envisaged, had to be changed over in "great haste" to conventional water heating.

The program on the improvement of the management of the national economy on the basis of computer hardware also did not yield the anticipated impact.

So far a general-purpose cotton harvester has not been developed.

During the 11th Five-Year Plan analogous programs were drawn up again. Now there are already 19 of them, the same problems are at the center of attention. But they were formulated in a somewhat different way. In the first version one of them sounds like this: "To develop and introduce in the national economy highly efficient solar power engineering installations for the heat supply of residential and municipal facilities. The main performer is the Physical Technical Institute of the Uzbek SSR Academy of Sciences. The responsible supervisor is Corresponding Member Comrade G.Ya. Umarov."

And the second version: "To develop and introduce in the program of construction systems of the heat supply of residential buildings, which are based on the combined use of solar energy and traditional sources of heat." The main organization is the Physical Technical Institute of the Uzbek SSR Academy of Sciences. The responsible supervisor is Academician Comrade A.S. Azimov, director of the institute.

It is aptly worded, is it not? The higher the rank of the responsible supervisor, the greater the additional insurance....

How did the next five-year plan conclude for this program? Of the 32 solar energy facilities envisaged for placement into operation only 2 are operating! Curious here is the report, which the institute issues jointly with the Tashkent Zonal Scientific Research Institute of Experimental Design of the Gosgradostroy and in which, in addition to the fact that it reports the full completion of the assignments in the scientific part and on the set dates, a stunning conclusion is cited: "As to the use of solar energy for the purposes of heating, as well as air conditioning, their (the installations') low efficiency and extremely high cost do not make it possible to count on extensive practical use. In this area it is advisable to continue research and to carry out individual experimental construction." A.V. Bubnov, chief of the Department of Solar Power Engineering Systems of the Tashkent Zonal Scientific Research Institute of Experimental Design, signed the report on 18 September 1985.

The majority of other programs also proved to be in approximately the same situation. Pulp and paper products were not obtained from guza-paya. The second section of the Republic Automated Control System of the National Economy was not turned over in good time, and the first section is operating inefficiently.

But life goes one, time demands, and 12 comprehensive goal programs are being planned already for the 12th Five-Year Plan. As the analysis shows, the methodological approach remained the same, but this time constructive conclusions were drawn already at the start.

The Republic Council for the Promotion of Scientific and Technical Progress attached to the Uzbek CP Central Committee erected a barrier to the free drawing up of documents. First of all the committed mistakes were analyzed. One of the most important conditions of the implementation of intersectorial scientific and technical programs is the vigorous dominant role of science. In a number of cases it proved incapable of assuming such responsibility. The outlined work on the implementation of the programs was not included in the state plans of the corresponding ministries and departments and, consequently, was not provided with material and technical resources, assets, and limits. For this reason the fulfillment of the outlined measures was of a optional nature. The coperformers did not have the proper interest, that is, once again state interest was superseded by narrow departmental expectations. It became obvious that such programs need special-purpose financing.

In pondering over the difficult tasks of the current five-year plan, you automatically come to the conclusion that today how quickly we will be able to change our methods in our work and whether we will be able to put to use the inexhaustible reserves, which are incorporated in the rapid development of scientific and technical progress, can ensure success. The task is to find and introduce in the immediate future highly effective forms of the merging of science with production.

Scientific production associations began to be established in the republic already during the 10th Five-Year Plan. The gained experience of such scientific production associations as the Tekhnolog, Uzbytplastik, Kibernetika, Signal, and Uzavtotranstekhnika associations shows that

industrial enterprises and entire sectors are obtaining from such unity with science timely and specific assistance in the retooling of production, the assimilation of new types of products, equipment, and advanced technologies, and the introduction of advanced methods of labor on a scientific basis.

The first years of work of the Tekhnolog Scientific Production Association showed its unquestionable effectiveness: innovations, which previously had not been introduced for years, found application in production. Thousands of tons of scarce metal were saved just by the assimilation of plastic items at the Soyuzmashkhlopkovodstvo All-Union Industrial Association. In machine building the use of tools made of superhard materials increased by twelvefold. A new subsector--standard-unit machine tool building--was established in the republic. Hundreds of machine tools were designed and produced, hundreds of mechanized flow and automated lines were developed. Mechanized complexes were introduced at the Uzbekselmash, Tashselmash, and Chirchikselmash plants. A section of NC machine tools was established at the Tashkent Tractor Plant.

Speaking at a meeting of the Council for the Promotion of Scientific and Technical Progress attached to the Tashkent Oblast Party Committee, General Director of the Tekhnolog Scientific Production Association R.Z. Khusainov reported:

"We should keep up with the proportionate development of the volume of design developments and capacities of our pilot production, which will make it possible to introduce new ideas immediately into production. Moreover, the extensive study of domestic and world achievements in the corresponding fields, sufficiently high skills of personnel, and the good supply of our own experimental base have enabled us to achieve the drastic shortening of the 'idea-new equipment' cycle. Thus, we needed only 9 months for the development of a robotized endless line of the machining of base members for the Tashkentskiy traktornyy zavod Production Association. The designing and production of the line were carried out simultaneously. We are spending on the average 6 months for the development of a standard-unit machine tool of an increased technical level. For comparison: in order to get an automatic line from the Ministry of the Machine Tool and Tool Building Industry, 5 years are needed, a standard-unit machine tool of average complexity--3-4 years...."

During the 11th Five-Year Plan the Tekhnolog Scientific Production Association performed work on the development of means of the mechanization and automation of production in the amount of 68 million rubles and produced 750 special machine tools and 9 automatic lines. At the enterprises of the sector and republic more than 2,000 people were freed and 7,000 tons of metal were saved. The level of mechanization of welding work at the enterprises of the Soyuzmashkhlopkovodstvo All-Union Industrial Association was increased to 96 percent.

Not by chance in the name of the association was the word "scientific" placed at the beginning. Precisely science and scientific organization are setting the tone and style in the work of the entire association. The secret of the successful activity of the Tekhnolog Scientific Production Association lies precisely in this. However, this is not the case at all the established associations. At a number of scientific production associations there is no

science at all, hence the impossibility of effectively solving important sectorial and especially intersectorial problems. Thus, the Proyekttekhnaladka Scientific Production Association is organizing its activity at the level of a planning bureau. Then why, one would like to know, was it established?

The Uzbekproyektmebel, Mestprom, Sredazselmash, and other scientific production associations are operating according to the same principle.

Great responsibility when establishing associations rests with ministries and departments. Unfortunately, several of them are displaying a passive position and are not becoming enthusiasts of the retooling of sectors. Thus, at the Silikat Scientific Production Association the return per ruble of expenditures comes to...10 kopecks! The plans of scientific research development here are make up mainly of borrowed sources, which are frequently not of great value for the existing construction materials industry. While scientific research proper constitutes only 5 percent of the total amount of operations, and of them many are unpromising. The pilot experimental base here is also weak, due to which prototypes of new machinery and nonstandard equipment are being produced late.

As a rule, major scientific developments with the greatest economic impact are of an intersectorial nature, consequently, their introduction is attended without fail by departmental barriers. For example, a fundamentally new machine, which was developed in a specific sector, will perforce require reorientation toward it and also the corresponding retooling in related sectors. As happened at the Uzbektekstilmash Production Association. A high-performance pneumatic spinning machine was developed here--this is a milestone in the practice of world spinning. Its output is distinguished by the highest quality, an enormous saving of raw materials is anticipated. But its mass introduction is being checked due to unsolved problems in the production processes which precede spinning. But only a powerful intersectorial scientific production association is capable of such work.

It must be noted that close integration with science, including VUZ science--the Tashkent Institute of Light and Textile Industry--marked the beginning of scientific and technical retooling at the Uzbektekstilmash Association and the Tashkent Textile Combine. The educational scientific production association, which was thus established, is a qualitatively new form of integration, within which scientists of the institute work purposefully on important tasks of production. The sector finances science, while science supplies the association with technical ideas and, what is of no small importance, personnel who are capable of embodying them.

In general VUZ science of the republic for the present is still far from production. At Tashkent University alone there are more than 100 doctors and 500 candidates of sciences. How are they influencing scientific and technical progress in the national economy of the republic?

"Our scientists," Prorector for Science V.I. Troitskiy said, "annually complete economic contractual jobs worth 7 million rubles. But they could do significantly more."

"What is getting in the way?"

"There are no orders. The ministries and departments are reluctantly agreeing to the establishment of problem laboratories, but they should also unite science with production. Our contacts with enterprises, unfortunately, are, as a rule, of a one-sided, special nature. Many scientists, therefore, are coming out in favor of long-term economic contracts on major scientific and technical problems. The advanced know-how of the people of Leningrad, Kiev, and Minsk shows that it is necessary to take the path of the establishment of educational scientific production associations. Even the little, but very fruitful experience of the Tashkent Institute of Light and Textile Industry also convinces us of this."

Efficiency experts and inventors could give enormous assistance in the acceleration of scientific and technical progress. However, as the analysis shows, a large number of proposals, which were formulated by them, are not being used. This is occurring mainly due to organizational oversights and the lack of the necessary pilot experimental base.

Today the party is posing the question of the sharp increase of the creative activity of the masses at large, and this means that, in working on the large-scale tasks of acceleration, it is necessary to create all the conditions for creative labor.

The experience of Hungary, Czechoslovakia, and Bulgaria suggests the idea of organizing in our republic so-called introducing firms. What is this? The state allocates assets, sets up pilot works, and purchases the innovations proposed by inventors. In this way a bank of technical ideas is formed. Then test runs of machines, equipment, and machinery are produced in conformity with the new ideas and are offered to various enterprises and sectors.

In Bulgaria, for example, such an introducing firm--the Progress Center of the Acceleration of Introduction--was established under the State Committee for Science and Technical Progress. It assumes the financing of research and all experimental operations--designing, engineering, the production of prototypes, and so on. The Progress Center works with partners on an economic contractual basis. A careful analysis and selection of promising ideas, which promise a large national economic impact, are made first. The firm assumes all the responsibility for the end results of introduction. Of course, a certain risk also exists here, since in case of failure with introduction all the expenditures affect its economic well-being. But this is also taken into account in the activity of the Progress Center: a special fund of rapid introduction, which is specified by the estimate plan, which is approved by the chairman of the state committee, has been established. The deductions to the fund are made both at the expense of assets of the state committee and at the expense of the enterprises which have introduced developments of the firm. The deductions make up about 30 percent of the maximum profit which was derived during the first 3 years after introduction of the innovation. Moreover, the Progress Center uses preferential credits of the Bulgarian National Bank and enjoys preference in the supply of material resources.

The introducing center has the right to hire for temporary work any specialists with the retention for them of the basic position.

The experience of the work of the Innovation Fund of the Hungarian People's Republic is interesting. It was established in 1980 by a decision of the Commission for Science Policy attached to the Hungarian Council of Ministers. The basic goal of its activity is the sharing of the risk and mutual advantage in the introduction of developments of scientists and inventors of the republic in practice. Just as in Bulgaria, in case of failure the expenditures, which are connected with introduction, are not returned to this organization, but if the introduced development has yielded a large impact, a portion of the derived profit is deducted for the fund.

An element of risk is characteristic of the activity of both firms, which increases significantly the responsibility and the quality of all work. It seems that this experience merits close study.

The further improvement of the management of scientific research, the acceleration of the pace of scientific and technical progress, and the integration of science with production requires the implementation in the republic of a number of organizational measures. First of all it is necessary to increase the authority of the main scientific headquarters of the republic--the Uzbek SSR Academy of Sciences, and to strengthen its role in the determination of the basic directions of the scientific and technical retooling of the national economy.

Today serious reform has been started in the system of the republic Academy of Sciences. Speaking at the annual assembly, Chief Scientific Secretary D.A. Musayev reported that three scientific production centers: Khlopkouborochanaya mashina, Vtorichnyye resursy, and Defoliant, have already been established, two engineering centers--Motor and Manipulator--have been organized. The commenced process of the active involvement of basic science in the accomplishment of specific practical tasks will also be developed and intensified further. Much has to be done on the use of the proposals of scientists in the area of biotechnology, chemistry, genetics, and selection.

Recently the first interdepartmental scientific technical complex for the development of a new cotton harvester began operating in the republic. Academician A.D. Glushenko is in charge of it. Included in the complex are: a scientific organization--four problem laboratories of the Institute of Mechanics and Seismic Resistant Construction of the Uzbek SSR Academy of Sciences; a planning and design subdivision, a pilot experimental works, and a pilot farm. The task has been provided with everything necessary for its fulfillment.

For the purpose of the day-to-day management of the entire process of the merging of science-technology-production it would be useful to establish a State Committee for Scientific and Technical Progress within the republic Council of Ministers. It should be given full state authority and all the capital investments, which are being channeled into the development of scientific and technical progress in the region, should be placed at its disposal. It is necessary to subordinate to the committee all applied

science, sectorial scientific research institutions, pilot experimental works, sectorial and intersectorial scientific production associations, and design and planning bureaus and to establish at its disposal a reserve of financial and material resources. In other words, it is necessary on a state basis to form the material and technical base of progress. The assets of the state committee, which will be formed not only from the state budget, but also by deductions from the profit of the enterprises and associations, which have introduced scientific ideas, can be allocated for the financing of the most significant developments of science and goal programs which are of great national economic importance.

Only on this basis is it possible to destroy interdepartmental barriers and to overcome interdepartmental isolation, which do not make it possible at present to solve important production problems.

The acceleration of the development of scientific and technical progress has been specified as the general direction during the 12th Five-Year Plan. The attention of the broad masses of workers has been attracted to it.

"It is important to increase party influence on the entire course of scientific and technical progress," it was stated at the 27th CPSU Congress, "to strengthen the party stratum in its decisive sections, and to devote more attention to the work in collectives of scientific research and planning and design organizations, technical services, and scientific and technical societies."

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LENINGRAD WINNERS OF 1986 USSR STATE PRIZES PROFILED

Leningrad LENINGRADSKAYA PRAVDA in Russian 23, 30 Nov 86, 2, 6, 9, 10, 13 Dec 86

[Article: "Leningraders Are Winners of the 1986 USSR State Prizes"]

[23 Nov 86 p 1]

[Text] Candidate of Physical Mathematical Sciences Vladimir Grigoryevich Maslov, senior scientific associate of the State Optics Institute imeni S.I. Vavilov.

The prize was awarded for the series of works "The Photobranding of Stable Spectral Gaps and the Selective Spectroscopy of Complex Molecules," which were published during 1972-1984.

Doctor of Chemical Sciences Dmitriy Nikolayevich Suglobov, chief of a laboratory of the Radium Institute imeni V.G. Khlopin.

The prize was awarded for the series of works "Compounds of Metals in Previously Unknown States, the Study of Their Properties, and Application," which were published during 1967-1984.

Doctor of Geological Mineralogical Sciences Yuriy Vyacheslavovich Bogdanov, chief of a sector of the All-Union Scientific Research Institute of Geology imeni A.P. Karpinskiy.

Doctor of Geological Mineralogical Sciences Eduard Ivanovich Kutyrev, senior scientific associates of the All-Union Scientific Research Institute of Geology imeni A.P. Karpinskiy.

Doctor of Geological Mineralogical Sciences Viktor Sergeyevich Domarev (deceased).

The prize was awarded for the series of works "Stratiform Deposits of Nonferrous Metals, Their Mineral Resources and Genesis."

[30 Nov 86 p 1]

[Text] Margarita Nikolayevna Petrova, senior engineer of the Northwestern Territorial Administration for Hydrometeorology and Environmental Control.

The prize was awarded for outstanding achievements in labor and a large personal contribution to the increase of the efficiency of operation of rail and air transport.

Doctor of Physical Mathematical Sciences Gilyari Moiseyevich Drabkin, chief of a sector of the Leningrad Institute of Nuclear Physics imeni B.P. Konstantinov of the USSR Academy of Sciences.

Doctor of Physical Mathematical Sciences Sergey Vladimirovich Maleyev, chief of a sector of the Leningrad Institute of Nuclear Physics imeni B.P. Konstantinov of the USSR Academy of Sciences.

Doctor of Physical Mathematical Sciences Aleksey Ivanovich Okorokov, senior scientific associate of the Leningrad Institute of Nuclear Physics imeni B.P. Konstantinov of the USSR Academy of Sciences.

The prize was awarded for the series of works "New Methods of Studying a Solid on the Basis of the Neutron Scattering of Stationary Nuclear Reactors," which were published during 1961-1984.

[2 Dec 86 p 1]

[Text] Doctor of Physical Mathematical Sciences Gennadiy Alekseyevich Leonov, professor of Leningrad State University imeni A.A. Zhdanov.

The prize was awarded for the series of works "The Theory of Phase Synchronization in Radio Engineering and Communications," which were published during 1964-1983.

Doctor of Physical Mathematical Sciences Aleksandr Nikolayevich Pisarevskiy.

Candidate of Technical Sciences Galina Ivanovna Tsukanova, docent of the Leningrad Institute of Precision Mechanics and Optics.

The prize was awarded for the development of a scientific complex of the Vega Project for studies of Halley's Comet.

Candidate of Technical Sciences Boris Nikolayevich Kotletsov.

Doctor of Technical Sciences Vadim Petrovich Veyko, chief of a chair of the Leningrad Institute of Precision Mechanics and Optics.

Gennadiy Aleksandrovich Kotov, senior scientific associate of the Leningrad Institute of Precision Mechanics and Optics.

Candidate of Physical Mathematical Sciences Mikhail Naumovich Libenson, senior scientific associate of the State Optics Institute imeni S.I. Vavilov.

The prize was awarded for the development of the technology, the devising of automated equipment, and the introduction in production of electronic instruments of the laser processing of film elements.

[6 Dec 86 p 1]

[Text] Candidate of Physical Mathematical Sciences Gennadiy Tikhonovich Razdobarin, senior scientific associate of the Physical Technical Institute imeni A.F. Ioffe of the USSR Academy of Sciences.

The prize was awarded for the series of works "The Development of Laser Diagnostic Methods and the Study of High Temperature Plasma in the Physics Experiment," which were published during 1963-1984.

Candidate of Medical Sciences Natalya Yakovlevna Shabashova, senior scientific associate of the Scientific Research Institute of Oncology imeni N.N. Petrov.

The prize was awarded for the development and introduction in clinical practice of methods of the restorative treatment of oncology patients.

Candidate of Technical Sciences Vladimir Valeryanovich Smirnov, director of the All-Union Scientific Research, Planning, Design, and Technological Institute of Electric Welding Equipment, supervisor of the work.

Yuriy Arsentyevich Vorobyev, chief project designer of the All-Union Scientific Research, Planning, Design, and Technological Institute of Electric Welding Equipment.

Ivan Nikolayevich Kondratenko, chief of a department of the All-Union Scientific Research, Planning, Design, and Technological Institute of Electric Welding Equipment.

Aleksandr Sergeyevich Nikitin, chief of a department of the All-Union Scientific Research, Planning, Design, and Technological Institute of Electric Welding Equipment.

Candidate of Technical Sciences Iosif Markovich Stroyman, chief of a laboratory of the All-Union Scientific Research, Planning, Design, and Technological Institute of Electric Welding Equipment.

Kuzma Matveyevich Negoduyko, director of the Leningrad Elektrik Plant imeni N.M. Shvernik.

The prize was awarded for the development and introduction in the national economy of a technology and equipment of the cold welding of metals.

[9 Dec 86 p 1]

[Text] Academician Mikhail Mikhaylovich Shults, director of the Institute of Silicate Chemistry imeni I.V. Grebenshchikov of the USSR Academy of Sciences.

Doctor of Biological Sciences Adolf Aronovich Lev, chief of a laboratory of the Institute of Cytology of the USSR Academy of Sciences.

Candidate of Chemical Sciences Olga Konstantinovna Stefanova, senior scientific associate of Leningrad State University imeni A.A. Zhdanov.

The prize was awarded for the series of works "The Principles of the Functioning of Transport Systems of Biological and Model Membranes and the Development of Selective Ionometric Devices," which were published during 1967-1984.

Doctor of Technical Sciences Vladimir Danilovich Stepanenko, deputy director of the Main Geophysical Observatory imeni A.I. Voyeykov.

Candidate of Physical Mathematical Sciences Georgiy Borisovich Brylev, chief of a laboratory of the Main Geophysical Observatory imeni A.I. Voyeykov.

Candidate of Technical Sciences Samuil Isaakovich Vaksenburg.

Candidate of Technical Sciences Nikolay Vladimirovich Gornostayev.

Candidate of Technical Sciences Grigoriy Fedorovich Shevela.

The prize was awarded for the development and introduction in the hydrometeorological support of the national economy of methods and equipment for radiometeorological observations beyond clouds, precipitation, and dangerous weather phenomena.

[10 Dec 86 p 1]

[Text] Aleksey Petrovich Morozov, chief specialist of the Leningrad Zonal Scientific Research and Planning Institute of Standard and Experimental Designing of Residential and Public Buildings.

Candidate of Technical Sciences Oleg Aleksandrovich Kurbatov, chief of a department of the Leningrad Zonal Scientific Research and Planning Institute of Standard and Experimental Designing of Residential and Public Buildings.

Georgiy Georgiyevich Zedginidze, chief of a department of the Leningrad Zonal Scientific Research and Planning Institute of Standard and Experimental Designing of Residential and Public Buildings.

Yevgeniy Pavlovich Lavrov, manager of the Sevzapstalkonstruktsiya Trust.

Yevgeniy Vasilyevich Toropov, manager of Construction Trust No 16 of the Main Administration for Housing, Civil, and Industrial Construction of the Leningrad City Soviet Executive Committee.

The prize was awarded for the development of membrane floors of long-span buildings and structures.

[13 Dec 86 p 1]

[Text] Doctor of Technical Sciences Vyacheslav Mikhaylovich Andreyev, chief of a laboratory of the Physical Technical Institute imeni A.F. Ioffe of the USSR Academy of Sciences.

The prize was awarded for the development and introduction in the national economy of instruments of incoherent optoelectronics.

Anatoliy Nikolayevich Mezhevich, deputy general director of the Leningrad Burevestnik Scientific Production Association.

Aleksandr Terentyevich Baranov, senior scientific associate of the Leningrad Burevestnik Scientific Production Association.

Candidate of Technical Sciences Anatoliy Isidorovich Levitin, chief of a department of the Leningrad Burevestnik Scientific Production Association.

Candidate of Technical Sciences Vladlen Vasilyevich Novikov, chief of a sector of the All-Union Scientific Research and Planning Institute of the Mechanical Processing of Minerals.

The prize was awarded for the development and introduction of a technology of the concentration of diamond-bearing ores and placers of Yakutia on the basis of the methods of X-ray luminescent separation.

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CSO: 1814/104

LATVIAN QUALITY-90 COMPREHENSIVE PROGRAM

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 23, 2-5 Dec 86 pp 4-5

[Interview with Secretary of the Latvian CP Central Committee Yan Yanovich Okherin, chairman of the Council for the Promotion of Scientific and Technical Progress attached to the Latvian CP Central Committee, under the rubric "The Problem Close Up": "The Main Step of Labor. The Latvian Republic Quality-90 Program Is in Effect"; date, place, and occasion not given; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] "Acceleration first of all is through technical progress, through the changeover to new equipment and technology, the stimulation of the human factor. The main thing is quality and once again quality!" M.S. Gorbachev said about this at the conference on the introduction of state product acceptance, which was recently held in the CPSU Central Committee.... The turn toward quality. It is necessary in everything: whether it is a question of product quality, the quality of labor, knowledge.... Life itself has placed these questions at the center of reorganization. Secretary of the Latvian CP Central Committee Ya.Ya. Okherin, chairman of the Council for the Promotion of Scientific and Technical Progress attached to the Latvian CP Central Committee, tells how this work has been organized in the Latvian SSR, where the Republic Quality-90 Comprehensive Program has been in effect since February 1986.

[Question] Yan Yanovich, in the Quality-90 Program one of the most important tasks is "the increase of the technical level, quality, and competitive ability of products, the bringing of the most important types of items up to the level of the best world models." It is a goal which, undoubtedly, conforms to the spirit of the reorganization of the economy and the entire economic mechanism. However, is there not excessive presumption here? For does it not happen that for a long period industry developed in the extensive direction, but then, having received new general instructions, up and decided to draw level with the best models of world products....

[Answer] Revolutionary goals, you are correct, have been set in the Quality-90 Program. And we fully realize that miracles do not happen as a result of only appeals alone and all of us will not immediately learn to work in the new way. The experience of quality control, which was gained during past five-year plans, and the long-standing traditions of occupational skill and the

conscientious and skillful labor of workers and specialists of the republic served as the basis for the formulation of the program. But the times have posed new tasks. You will agree, without a clear specific goal any program becomes an unviable, token one. The goal should be an exacting one, which mobilizes all the available reserves. However, in this case this, we believe, is also not enough. Without a creative search and the active involvement of new, previously unused possibilities, we will not be able to accomplish the posed task. This is obvious. What has been said concerns not only product quality, but also the growth rate of production and the development of machine building and the sociocultural sphere.

We believe that the goal has been properly set. Judge for yourself: generations of specialists have been educated in the spirit of an orientation toward the level that has been achieved at present. Moreover, as long as a designing idea, which originated as a result of the study of, I repeat, present-day equipment and technology, was implemented, a "new" item--the product of the labor of developers--became the yesterday of the world level. It also could not be otherwise, since the task of surpassing the best world models--the ones that will appear in several years, and not the ones that by the time of the appearance of our item prove to be already obsolete--was not directly posed. For competitors do not stand still....

[Question] In other words, whatever the demand was, such was the supply?

[Answer] Precisely. When dealing with the formulation, and now the implementation of the Quality-90 Program, we were forced to admit that today not only students of higher educational institutions and tekhnikums have to grasp the meaning of such concepts as, for example, "the competitive ability of products." Even experienced engineers and production managers at times adhere to erroneous notions with regard to this issue. They reason as follows: a commodity should be competitive if it is exported to the foreign market. If this is not planned, why should it be competitive? It is a profound misconception. Here it is not taken into account that such most important indicators as the technical level, reliability, materials-output ratio, and, as a consequence, the possibility of selling the product on the foreign market are included in the very concept of competitive ability.

[Question] In the Quality-90 Program competitive ability is introduced as one of the special-purpose standards. How is this indicator taken into account in practice?

[Answer] Frankly speaking, so that the indicator of competitive ability would begin to function properly, much work still has to be done. Unfortunately, for the present there is no mechanism which determines unequivocally whether or not a new item is competitive on the world market. Much subjectivism still exists in the existing evaluations. Imagine the following situation: our industry has produced an advanced item, of which for the present there are no analogs in world practice. With what is it to be compared? If an analogous product does not exist, if it is also impossible to make a comparison in accordance with the chart of the technological level, it remains merely to demonstrate, by relying on forecast evaluations, that the new item might be

better than analogous models, which will only appear in other countries after some time.

[Question] This is really "sailing in the fog" without navigation instruments: it is unknown whether you will achieve the goal of your trip, by relying only on intuition. But if you do achieve it, how soon? Will not others, whose "ships" are furnished with all the necessary equipment, get there first? Apparently, does such a situation not stimulate very much daredevils to seek "terra incognita"?

[Answer] That is the whole point. In my opinion, the methods of evaluating the technical level of a new item and comparing it with the world level as yet have obviously been inadequately developed. And here one cannot do without the recommendations of the State Committee for Standards, the State Committee for Science and Technology, sectorial science.... Already today we have at times an urgent lack of them.

[Question] In order to keep track of the world technical level and to keep, as they say, tabs, a well-organized system of scientific and technical information is necessary. Without this it is also impossible to engage in any serious forecasting.

[Answer] Of course. We live, after all, not in an isolated world, and the Quality-90 Program itself arose not because we in the republic wanted it that way. We are taking into account the approach to the problems of the technical level and quality in the world as a whole. For this an information data bank, which contains all the necessary information on the best models of world products which are of particular interest for us, is being developed in the republic. This work, once begun, should be carried out continuously, for such a data bank should be regarded as a "living," constantly developing organism which reflects the development of science, equipment, and technology. In order to easily get one's bearings in world production, the continuous study of emerging trends and the continuous tracking of the changes occurring in the world are required. Not, of course, to copy, but to know what direction will be dominant in the next few years.

However, for the present our specialists have few opportunities for prompt acquaintance with foreign information. Even those who are ready for work at the world level today are encountering enormous difficulties in obtaining all the information necessary for analysis. It takes a long, intolerably long time to get to the specialist. The data bank being created is also called upon to change the situation for the better. It has been decided in addition to it to organize in the republic a permanent changing exposition of goods, which interest our industry and are produced in other regions of the country. It must be admitted that we are still studying inadequately even domestic experience which has been gained in other republics. But this is also, in my opinion, a considerable reserve which is capable of giving developers a new stimulus and of generating new ideas. Acquaintance with "living" items will also contribute to the formulation of a forecast for the future. Unfortunately, many people so far do not understand the importance of precisely this stage in the development of a future product. Meanwhile, by

continuing to further display helplessness in forecasting, we are doomed to constantly be in far from the first ranks in the world.

The exposition, the establishment of which will be completed in the very near future, should help developers already before the start of series production--especially of consumer goods--to estimate how successful the item turned out to be and what demand it will have. And depending on this industry will be able to plan with greater confidence the scale of future production.

The task of doing better, more, and with fewer expenditures is especially urgent for us, as in no other developed country of the world. Production costs and waste are a result of a low technical level. It is impossible to make progress without having raised it. The basic reserve here is the strengthening of the contacts of academic and sectorial science with production and the conclusion of contracts on creative cooperation between enterprises, scientific research institutes, design bureaus, and higher educational institutions of the republic. We expect a high return from the seven republic interbranch scientific technical complexes which have been established here.

The development of a strategy of the intensive replacement of obsolete machine tools and equipment and the modernization and updating of production on the basis of high-performance machines are among the numerous problems which have to be solved. The evaluation of the active portion of the fixed production capital shows that only 17.5 percent of it corresponds in the technical and economic parameters to the world level, the remainder requires modernization or complete replacement. It is clear what importance we are attaching in this connection to the implementation of the program of the technical modernization of the national economy. It is possible to achieve the goals outlined in the program only on the solid base of new equipment and technology.

[Question] Today, obviously, one should already speak not only about the quality of the final product, but also about its numerous components, starting with the quality of the idea itself and ending with its implementation.

[Answer] I would suggest descending another step lower on the hierarchical ladder of quality--to schools and higher educational institutions, where the quality of knowledge is formed. For example, the teaching of information science at the majority of schools for the present is being carried out exclusively theoretically--the technical base is lagging, there are not enough personal computers. What is to be done? Here you will not jump higher than your head.... But time marches on. Here we decided along with the work on computerization to launch a republic program of the electronization of the national economy. It has many aspects. With respect to students this program gives them the opportunity already today, at the existing technical base of such large associations as VEF, Radiotekhnika, and Alfa, to familiarize themselves with modern computer hardware. When the former 10th grader--who has already more than once visited, say, the VEF Association--comes after graduating from school to the works, he will undoubtedly be more prepared for work with complex measuring equipment and will be able to achieve more rapidly a high occupational level and, hence, quality of work. You see how everything is interconnected.

The study of the questions of standardization, metrology, and product quality control is now being included in the syllabuses of higher and secondary specialized educational institutions.

[Question] So far you and I have been speaking about the general directions of the Quality-90 Program. But each of them will simply remain a directive, if it does not find the corresponding response in the consciousness of the performers of the program....

[Answer] I understand. You want to ask what is envisaged by the program with respect to the stimulation of the human factor. I will begin with a quite interesting, in our opinion, sociological study. It was completed just recently and was conducted on the initiative of the Industry Department of the Latvian CP Central Committee by specialists of the Leningrad Institute of Socioeconomic Problems jointly with Latvian sociologists. The study under the motto "Quality. Economy. Discipline" was conducted at 14 enterprises of 6 cities of the republic. The goal was set to identify how workers evaluate the production situation which is forming in labor collectives in the process of the drive for acceleration; in what they see the causes of the output of poor-quality items, violations of discipline, and waste; what, in their opinion, the reserves and means of solving urgent problems are.

The responses of the workers revealed not only the socioeconomic, but also the enormous moral and psychological significance of the drive for quality. Today only 2 percent of those surveyed noted that they are proud of the quality of the products of their enterprise and of the items, in the production of which they are personally participating. In all 45 percent of the surveyed workers gave a more reserved, but still positive appraisal of the quality of items. The percentage of negative appraisals is also the same. Here only 6 percent of the workers admitted that the low quality of the items produced by them causes them a sense of shame.

To what, in the opinion of the workers, is such a state of affairs due? The main causes of the output of poor-quality products--so the absolute majority of those surveyed believe--lie in the low quality of raw materials, materials, and components, as well as in the poor organization of production: downtimes, crash work, disruptions in material and technical supply.... Nearly a third of those surveyed noted that low quality springs from costs in the system of the remuneration of labor, wage leveling, and the lack of material stimuli for conscientious labor.

The designers and developers of items also caught it. In all 28 percent of the workers linked the low quality of products directly with the level of planning and design developments.

You will agree, there is a considerable share of truth in these impartial appraisals. However, the extremely low level of information of the workers about the state of affairs in their labor collectives cannot but arouse anxiety. The survey showed that 44 percent of the workers are not familiar with or know by hearsay what the plan assignments of the year are for their shop, section, and even brigade. Two-thirds of those surveyed were not

informed about the production plans of the enterprise as a whole. The prospects of development of their enterprise are unknown to 44 percent of the workers. One in five indicated that he does not know what the share of defective output is in the production volume of his shop, section, and brigade.

Nearly 60 percent of those surveyed reported that they do not know whether products with the Emblem of Quality are produced at their enterprise. In all 36 percent of the workers noted that they do not know anything about the Republic Quality-90 Program and its goal standards.

Such are the objective data. And we cannot but consider the situation, in which the drive for quality is beginning in industry of the republic.

[Question] In science there is the following definition: a negative result is also a result....

[Answer] We also perceive in precisely that way the results of the sociological study. A comprehensive analysis of them is being made, the final conclusions still lie ahead. But it is now already quite obvious: the ideological support of the Quality-90 Program requires a decisive turn toward new, nonstandard forms of carrying out lecture propaganda and party work as a whole. Another thing is also obvious: in the matter of involving the human factor we have truly enormous reserves. Wherever this most important factor has already begun to work, the picture is entirely different. I have in mind the establishment at enterprises of action groups of quality, to which workers also belong. Such groups appeared for the first time in the republic just half a year ago. But the return from their activity is noticeable already today.

Another effective lever of the involvement of the human factor is the improvement of the system of material stimulation. The times, when the bonus was perceived as a certain automatic wage increment, are receding into the past. In many labor collectives today their own statutes on the procedure of the crediting of bonuses in accordance with the results of work for the quarter, half a year, and so on have been or are being drafted. These documents specify the general statutes on the payment of bonuses with allowance made for the specific nature of production. And what is especially important, such a system of the payment of bonuses, which places in the forefront not the quantitative, but first of all the qualitative indicators of labor, is being developed at many enterprises. In percentage terms a larger portion of the bonus is credited precisely for the quality of labor and, hence, the produced output. In this way an atmosphere of intolerance toward hacks and slipshod workers, through whose fault the brigade was not able to achieve high qualitative indicators, is being created in the collective.

Not simply the desire to work well, but the aspiration to create conditions, under which it is impossible to work poorly, is becoming a characteristic trait of a larger and larger number of workers of the republic.

[Question] But the workers, who admitted on the questionnaire of the sociological survey that the tasks of increasing quality at the enterprise are

unknown to them, in essence have also taken their first step toward a socially active position in life!

[Answer] Just their participation in the study--moreover, voluntary participation!--testifies to much: the worker has gotten tired of glossing over shortcomings, here he has joined in the general campaign of the broadening of openness and the democratization of production relations. Do not worry, tomorrow you will see him among the members of the action group of quality of his own shop and plant.

[Question] And then we will no longer come to sociologists, while a quite specific manager of production will have to blush from the questions: Why has smooth work not been set up, who is disrupting deliveries, and what is being done to change the formed situation....

[Answer] The Quality-90 Program is becoming a part of the consciousness of everyone. Imagine, what food for thought just acquaintance with the results of such a sociological study gives the manager! I am confident that soon in Latvia not one indifferent person will remain. But the program is just beginning to work.

In continuation of the conversation about the role of the human factor I want to add that the radical increase of the quality of products and labor is also impossible without the settlement of social questions: the improvement of the work of services and the creation of favorable conditions for the labor and relaxation of workers. This important problem has been included as a supporting subprogram of the increase of the quality of labor life. It presumes the strengthening of the material and technical base of public dining, the making of various types of services available to workers and employees, the improvement of medical service--in short, the use of all possibilities for the assurance of highly productive labor and full-fledged relaxation.

The idea of the Quality-90 Program would be incomplete, if nothing is said about the change occurring in the thinking of management personnel of all levels. The main task here is the cultivation of a sense of responsibility for the quality of labor, no matter with what you are dealing--production, daily life, services.... For the manager this sense should be especially heightened: for due to his mistake alone and ill-considered decision all production suffers and the national economy incurs losses. But this does not mean that we are striving to take away the desire for independence, which, as is known, increases the probability of mistakes. On the contrary, we are for bold, even risky decisions of managers. Without this it is now simply impossible to manage production and the economy.

In February 1986 the Latvian CP Central Committee and the Latvian SSR Council of Ministers adopted a decree, in conformity with which the task of the training and advanced training of economic managers, leading specialists, and engineering and technical personnel of ministries and departments, associations and industrial enterprises--including those of union .pa subordination, which are located on the territory of the republic--in the area of product quality control, metrology, and standardization is assigned during

the 12th Five-Year Plan to the Ministry of Higher and Secondary Specialized Education, the Intersectorial Institute for the Improvement of the Skills of Specialists of the National Economy of Latvia, and the Riga Chair of the All-Union Institute of Standardization and Metrology.

[Question] You were a participant in the recent conference in the CPSU Central Committee on questions of the introduction of state product acceptance. How are they preparing for it in the republic?

[Answer] Such an action is not something new for us. Experimental state acceptance has been carried out since November of this year at a number of our enterprises. It must be admitted that extradepartmental monitoring, which is carried out by highly skilled, demanding specialists, disciplines not only production managers, but also the entire labor collective, including even the most negligent workers. However, such a step as state acceptance will become even more effective, if monitoring over the entire chain of the production of one item or another is comprehensive and will encompass all enterprises which are participating in its production.

State acceptance on the scale, which is planned as of January 1987, is a matter of enormous importance. It is simply impossible to do without a comprehensive approach in the solution of the problems of quality. Precisely it, as practical experience shows, is capable of getting one out of any difficulty. We, on our part, are ready to provide all the necessary conditions for the effective work of the organs of state acceptance. Moreover, the question of establishing a special section of the Quality-90 Program, which takes into account the mechanism of state acceptance and the peculiarities of the functioning of enterprises under these conditions, is now being examined. For as a result it will be necessary to be responsible jointly for the quality of the final product.

Having set ourselves the goal to increase sharply the quality of the output being produced in Latvia, we have already today achieved such a situation, in which production managers and party workers are dealing with the problems of quality not for reporting, but skillfully, systematically, and with allowance made for the future. Much work is being performed by the councils for the promotion of scientific and technical progress attached to the city and rayon party committees, the coordinating councils.... And still we believe that the questions of quality in the budget of time of the present-day manager still do not take up as much space as the formed situation requires.

The priority comprehensive program No 1--Quality-90--has been in effect in the republic for less than a year. This is both a little and at the same time a lot, if you consider that in the five-year plan there are only 5 such years. The arising problems and how they are being solved were discussed at the Latvian CP Central Committee Plenum--the high forum of communists of the republic--which was held in late November. Much still has to be done. But

today we have also understood much of what still seemed unclear yesterday. The Quality-90 Program is directing its own business in industry, science, and education. This is the main thing. There is no longer anywhere to retreat. Quality in all its manifestations has become our daily concern.

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MARCHUK ON KEY PROBLEMS OF REFORM IN SCIENCE

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 1, 1-19 Jan 87 pp 4-5

[Interview with President of the USSR Academy of Sciences Academician Guriy Ivanovich Marchuk by A. Lepikhov under the rubric "A Topical Interview": "The Scientific Potential of Reorganization. The President of the USSR Academy of Sciences Answers the Questions of the Editorial Boards of NAUKA I ZHIZN and NTR: PROBLEMY I RESHENIYA"]

[Text] [Question] It is well known that in practice none of the present problems of the development of society can be solved without the most active participation of science. What is the reference point, from which the Academy of Sciences began its advance during the current, 12th Five-Year Plan?

[Answer] At the 27th CPSU Congress in the Policy Report of the party Central Committee it was noted that in the past quarter century our country has made impressive gains. The fixed production capital of the national economy increased by sevenfold, thousands of enterprises were built, and new sectors were established. Our national income increased by nearly fourfold, industrial production--fivefold, and agricultural production--1.7-fold.

A powerful scientific and technical base was created, it is enabling our scientists to conduct research in practically all the present main directions. It is by their efforts that atomic machine building, space and laser technology, and the electronics and microelectronics industry were developed in our country and the production of diverse synthetic products was organized.

I especially want to speak about mathematics. Large scientific schools, which have world fame in many directions, have been formed in the country. Particular attention has always been directed in our country to the development of basic work in mathematics, since the level of its development and the degree of use of computer hardware to a significant extent now determine the potential of all science.

It is natural that in mathematics itself and its applications theoretical research, which is aimed at the further development of this science itself, held and holds the leading position. And it is just as natural that many theoretical achievements of our mathematics scholars find new life initially as applied research, and then as new technologies, machines, and instruments--

in short, they turn into everything that sustains scientific and technical progress.

The most diverse objects are in the sphere of scientific interests of our biologists. This research is opening the way to the effective combating of vascular, oncological, and other diseases. The methods of genetics, which are connected with the breeding of new strains of plants and highly productive species of agricultural animals, are also advancing. The scientific principles of the efficient use and protection of soils, mineral resources, the plant and animal world, and the air and water basins are being formulated.

Intensive research has encompassed the entire set of chemical sciences, in which first of all attention is being directed to the synthesis of materials with preset properties. Continuous chemical technological processes, which are called upon to intensify chemical production drastically, are being introduced in place of the now widespread periodical processes.

The technological principles and software of computer hardware are being improved; highly efficient systems of the control of complex technological processes, units, and works have already been developed and are being developed on its basis.

The results of basic research in solid-state physics, optics, radiophysics, gas dynamics, and thermal physics have become an important source of scientific and technical progress.

I believe that here it is appropriate to dwell on several of the 42 works, to which the 1986 State Prizes were awarded.

A group of physicists from our leading nuclear centers formulated the physical principles and developed new methods of studying solids by means of neutron scattering at stationary nuclear reactors.

The series of works of our chemists "Compounds of Metals in Previously Unknown States of Oxidation, the Study of Their Properties, and Use" was also commended with the lofty award. The authors of these works established a new field of science--the chemistry of elements in unusual valent states. The compounds, which were synthesized by the chemists, are already being used for the obtaining of new catalysts and semiconductor and various construction materials.

The prize was awarded to a group of scientists from Moscow and Yerevan for the series of works "Mathematical Research on the Qualitative Theory of a Circulating Liquid." This research is an outstanding contribution to the development of the theory of differential equations with partial derivatives. It is in addition of great applied importance.

The works of Soviet scientists, who obtained for the first time so-called fine-structure spectra of complex molecules, have already won international fame. As a result spectral resolution was increased by a factor of 10^4-10^5. The obtained results can aid the solution of the problem of the high-speed holographic recording of fast processes.

At the same time highly selective and extremely sensitive methods of the spectral analysis of various mixtures of complex organic molecules were developed.

A collective work of Siberian scientists--the six-volume monograph "Osnovy gidrogeologii" [The Fundamentals of Hydrogeology]--was also commended with the USSR State Prize. This is the only publication in the world, in which not only are the questions of the use and protection of ground waters presented with exhaustive thoroughness, but recommendations on the combating of the pollution of water resources are also given.

The closed system of production water supply and the processing of waste products, which was introduced at the Pervomaysk Khimprom Production Association, is an example of the comprehensive approach to the solution of ecological problems. The collective of authors, which developed this technology, which does not have analogs in domestic and foreign practice, was also commended with the State Prize.

The same award was conferred on the scientists, who formulated the general concept of the development of automated dispatcher control systems of the Unified Power System of the Soviet Union--an object of control, which is unique in complexity.

The scientists, who assimilated the large-series production of automated laser equipment, which has been extensively introduced in industry, as well as developed and introduced various types of equipment and technology of the cold welding of ductile nonferrous metals, also became winners. More than 100 inventor's certificates confirmed the originality of this technology.

Among the winners of the USSR State Prize there are also a number of medical scientists, who developed fundamentally new models of neuropathological syndromes of disorders of the higher nervous activity of man, developed several methods of the intensive therapy and resuscitation of neonates and infants and introduced in clinical practice new methods of the diagnosis and surgical treatment of tachyarrhythmias, as well as ensured the development, series assimilation, and introduction in medical practice of the Lenta-MT diagnostic microprocessor complex for the study of the cardiovascular system of man.

The works of Soviet scientists served as the basis for the successful solution of important economic and social problems.

Of course, not immediately and not all basic research received its practical completion. At times years and even decades pass before the practical significance of some basic scientific directions or others comes to light.

That is what happened, for example, for many sections of mathematics, which only after lengthy development found practical application--in the field of computer technology, in the development of methods of designing nuclear reactors and thermonuclear installations, and for the solution of problems of astronautics and aeronautics.

But at the same time we believe that the impact from the introduction of scientific research could have been incomparably greater. It is a question, of course, not of curtailing basic research by increasing the attention to the problems of the practical introduction of scientific and technical achievements. But today there is required of science, and this was emphasized in the decisions of the 27th CPSU Congress, a more vigorous turn toward the needs of production and its retooling.

[Question] What do scientists have to do during the current 5-year period and in subsequent years?

[Answer] To broaden significantly the front of research in molecular biology and genetics, computer technology and robotics, laser and cryogenic engineering, nuclear and thermonuclear power engineering, immunology, medicine, and other fields of science and technology.

But here it is impossible not to mention the special conditions, under which we have to perform work on the acceleration of scientific and technical progress. First of all the growth of the population of able-bodied age is now decreasing in the country, the consequences of the war are making themselves felt. That is why the saving of labor resources is the first and a mandatory component of the development of scientific and technical progress.

The second component is power engineering. If you trace carefully the growth rate of the per capita national income, it is easy to see that it reflects almost exactly the growth rate of power engineering.

[Question] What does this mean?

[Answer] Science and technology have now achieved such a level, when many new ideas and feasible solutions exist, but not all of them can be embodied, because there are not enough energy resources. Therefore, the problems of power engineering are becoming the key ones in the economy.

[Question] If you analyze the set of most difficult tasks in the field of science and technology, which were posed by the party congress, which one among them, in your opinion, is the key one? Is it perhaps the task of introducing the results of scientific and technical progress?

[Answer] Indeed, much depends on how fundamentally we learn to unite research and planning and design work with production and with the rapid assimilation of the output of products which correspond to the world level. And the main unit here is the acceleration of the introduction of scientific discoveries and inventions in practice. The country has achieved much, but today the rate of progress is being checked not due to the lack of promising ideas and developments, but due to slow mass introduction. Consequently, primary attention must be directed to the improvement of planning and management at all stages of the "science-production" cycle. This was discussed both at the April (1985) Central Committee Plenum and at the 27th CPSU Congress.

It is necessary to speed up the process of movement along the chain from basic to applied research, and from it to experimental design development and the introduction of new equipment in production.

In this connection the task of intensifying basic research and development in the area of modern technical problems, of seeking new means and methods of improving machines, and of solving urgent scientific problems face science.

[Question] What is it necessary to do so that scientific and technical progress would enter our life as quickly as possible?

[Answer] First of all to properly select the priority directions of science and technology and to balance their development efficiently.

As practical experience shows, today the introduction of advanced technological processes is becoming the leading thing.

By the end of this century in our country it is planned to accomplish the complete technological modernization of production and to increase by 1.5- to 2-fold the scale of the use of new advanced waste-free technologies, such as membrane, laser, and plasma technology, technologies with the use of ultrahigh pressures and pulse loads, and others.

The technological improvement of production is now oriented toward its integrated automation and mechanization. In industry it is planned to put into operation about 5,000 plant technical management automation systems. As a result on the average the level of automation in the national economy by 2000 will increase by twofold.

[Question] Guriy Ivanovich, you have repeatedly said that the latest technology is the most effective form of capital investments: it usually pays for itself in 1 to 1.5 years, while in machine building--in less than a year. If you consider that the average "lifetime" of essentially any technological process today comes to approximately 7 years, of them we derive a net profit for 5.5 years.

Mechanization (here I am again basing myself on one of your statements) also pays for itself quite rapidly. Given an average return of 34 kopecks a year per invested ruble in the mechanization of production, the profit begins to enter the budget in just 3 years. But here is an unexpected, at least for me, figure: the return from the automation of production comes on the average to 15 kopecks per ruble of expenditures a year. In other words, it pays for itself only after 7 years, that is, when the automated works becomes completely obsolete. What is going on here, is it worth engaging at all in such "automation"?

[Answer] Do not be in a hurry with conclusions. For now you constantly encounter far from by chance the word "integrated": integrated mechanization and integrated automation. But given such an approach to the matter the figures are completely different. Thus, integrated mechanization--from the start to the end of the technological chain--per ruble of investments yields an economic impact of a ruble. Instruments and means of automation give us

15 kopecks each a year per ruble of expenditures, while when assembled together into a plant technical management automation system, they yield on the average 1 ruble 10 kopecks per ruble of expenditures. The economic impact here is just as great as from the introduction of the latest technologies.

What is the conclusion? There is just one--it is necessary to give preference to new technologies and means of automation and mechanization, which attain the maximum level of the economic return. If you add to this the task of the utmost stimulation of the production of new materials and include all the processes which lead to the saving of labor, raw materials, and energy, we will also obtain a group of questions which should have the highest priority at the USSR Academy of Sciences, at higher educational institutions, in sectors of industry, and in the national economy as a whole.

Moreover, we need to show concern for the drastic speeding up of the introduction of inventions. Now new knowledge and new technologies depreciate quite rapidly. And if we are not able to use rapidly a technology, in which new inventions "have been put to use"--it is closest of all to production--with each lost year the economic impact will also decrease.

As you realize, the monitoring of the use of major inventions and scientific discoveries in the national economy is needed. It is necessary to learn to forecast the gain from their introduction in all the sectors of the national economy. Not to be recorders of events, but to actively influence them--such is the command of the times.

[Question] I would like to ask a question about the problem of increasing quality, which is of major social and political importance. And from the economic standpoint it is clear that the higher the quality of a product, the less of it is needed.

In recent times in this area definite changes have occurred. But another thing is also true--the quality and technical and economic level of items still remain one of our vulnerable spots. What contribution can scientists make to this important matter?

We have already begun the implementation of an entire set of measures, which are aimed at the development of the production of machines and equipment of new generations and at the significant increase of the reliability, capacity, as well as other technical and economic parameters and indicators of new equipment. The ultimate goal of this work is the achievement in a number of directions of leading scientific and technical positions in the world. But the path to this ultimate goal passes through the increase of the demands on the evaluation of both the technical level and the quality of the output being produced.

As is known, today in case of the output of products, which do not satisfy the demands of the world level, the price for them is reduced (this, you will agree, perceptively "hits in the pocket" the producer). Developers now bear full responsibility for the realization of the long-term demands on the technical level and quality of the items which they design. It is prohibited to turn over to production developments, which in their basic indicators do

not correspond to the indicators of the long-term world level. The system of technical control at enterprises and associations is being reorganized, organs of the State Acceptance of Produced Output have been established. But, of course, no matter how important the various organizational measures are, it is necessary to understand the main thing: it is possible to obtain a real national economic impact from the use of the latest achievements of science and technology in social production, only by having "reequipped" our entire national economy. On the basis of this fundamental assumption, a new investment and structural policy was formulated at the 27th party congress.

In conformity with its basic principles capital investments are now channeled not into the construction and expansion of capacities on an old technological basis, but mainly into the retooling and renovation of operating works. The ratio between the amounts of capital investments, which are being allocated for resource-producing and resource-consuming sectors of the national economy, is also changing. Priority today goes to the latter and, hence, to resource-saving technologies. Moreover, in the distribution of capital investments we are now directing attention not so much to the increase of the quantitative amounts of production as to the improvement of the quality of the output being produced.

Under these conditions the decision on the primary development in our country of science-intensive sectors--machine building, electronics, chemistry, the production of new construction materials--is fundamental and natural. Thus, the output of advanced materials during the years of the current five-year plan will increase by more than a third, traditional materials--by only 6 percent. While, for example, the production of various composites, which will be developed by our scientists during 1986-1990, will increase by ten- to twelvefold.

The rights of enterprises will be broadened and greater independence will be granted to them in the use of the production development fund, which is at their disposal.

It is clear that considerable material and technical resources and specific limits of contractual operations are needed for the retooling and renovation of production. They are being allocated for these purposes today in a priority manner.

[Question] You have named factors, without which the retooling of the national economy and its fundamental modernization are impossible. Which one of them, in your opinion, is the key one?

[Answer] Without a doubt the acceleration of the development of machine building. For the foundations of a broad approach to fundamentally new resource-saving technologies and the increase of labor productivity and product quality are laid precisely in this sector. Precisely for this reason for the acceleration of the development of machine building and the output of new systems of machines, equipment, and instruments it is deemed necessary to increase by 1.8- to 2-fold during the current five-year plan the capital investments in this vast complex of the national economy. The growth rate here during 1986-1990 will be 1.9-fold greater than for industry as a whole.

In accordance with the decisions of the congress, the replacement of the active portion of the productive capital of machine building will be increased during the 12th Five-Year Plan to 10-12 percent annually.

But machine building itself as a whole, in order to become the main factor of the retooling of the national economic complex, should also absorb the latest achievements of machine tool building, instrument making, and the electrical equipment and electronics industries. Therefore, the growth rate of the output of products in these science-intensive sectors will be 1.3- to 1.6-fold greater than in machine building as a whole.

It is necessary to constantly remember that the main means of achieving high results is the convergence of science and production, which will also enable us to carry out the technological retooling of the national economy on a broad scale. In fact it is a question of the real reform of sectorial science. It is necessary to establish large technological centers. In 1986 we had about 400 scientific production associations, while this year their number will increase to 500. In this connection the group of scientific research institutes and design bureaus, which are being grouped with scientific production associations, is already being enlarged significantly. The statute on scientific production associations is being revised, the economic planning mechanism of their functioning is being improved.

Sectorial science needs assistance in the supply with instruments and means of automation and with modern scientific equipment. It is also necessary to attract here additional highly skilled personnel.

[Question] We should probably think precisely today in categories of the future. It is extremely important to understand and imagine the future of science for a decade ahead first of all because precisely profound theoretical ideas have a revolutionizing effect on society as a whole, on the development of productive forces, and on scientific and technical progress.

To what would you give preference? What is it desirable to "foresee" first of all?

[Answer] Undoubtedly, the origination of fundamentally new technology. As a rule, only a fundamental discovery brings about a new technology, while the acceleration of scientific and technical progress depends directly on it.

One of the main causes of the relatively great expenditures of resources per unit of output being produced is the unsatisfactory level of many technological processes. Precisely technology is also the central connecting link in the "science-production" chain, since any new idea should be realized in a specific technology. The arsenal of technologies is regarded as the basic national wealth far from by chance in the economically developed capitalist countries, while trade in them in practice has been reduced to a minimum.

The present demand on technology is to be energy- and materials-saving, highly productive, and low-waste (and even better, waste-free). In short, resource-

saving. The development of such technologies should become the heart of our entire science and technology policy.

Without relaxing in any way the attention to basic science, we must support and develop in every possible way the research, owing to which it is possible in the shortest time to develop new, highly efficient technologies and to actively introduce them into the national economy.

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ACHIEVEMENTS OF REPUBLIC ACADEMIES OF SCIENCES

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 1, 1-19 Jan 87 p 4

[Article: "News From the Academies"]

[Text] The Ukrainian SSR Academy of Sciences

Scientists of the Physical Mechanical Institute imeni G.V. Karpenko of the Ukrainian Academy of Sciences succeeded in transforming destructive friction into constructive friction.

Having replaced the abrasive disk of a grinding machine with a metal disk for increasing the interaction of the rubbing parts, in case of high speeds and rapid cooling in fractions of a second they obtain a protective layer on the surface of a part. The film, which originates in case of friction, is not subject to corrosion, is resistant to wear, and protects the metal against the effect of corrosive media.

The new method of machining parts, which was used at the Lvov Konveyyer Production Association for the strengthening of the chains of load-carrying conveyors, increased the reliability of the mechanisms by 2.5-fold.

The Kazakh SSR Academy of Sciences

For more efficient petroleum refining at the Institute of Petroleum and Natural Salts Chemistry of the Kazakhstan Academy of Sciences they used ultraviolet radiation.

Research showed that in ultraviolet rays hydrocarbon raw material splits, releasing ethylene and propylene. In accordance with the developed technology it is possible to convert them into ethane, propane, and methane, as well as use them as a fuel or a raw material for the production of polymers.

The Estonian SSR Academy of Sciences

The Elis laser, which simultaneously mastered many occupations: from the remote diagnosis of vast physical chemical processes to surgery, was developed at the Institute of Physics and the special design bureau of the Estonian Academy of Sciences. Together with Moscow physicians Estonian scientists

began experiments on the correction of near-sightedness with the aid of the laser. A computer controls the operation of the Elis.

The Far Eastern Scientific Center

A powder for ships, which protects them against sea water, which corrodes metal, was proposed by scientists of the Institute of Chemistry of the Far Eastern Scientific Center of the USSR Academy of Sciences.

The introduction of the new method of treating hulls and parts just at one enterprise of Far Eastern Kray will save millions of rubles.

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ACADEMY PRESIDIUM ON CREATIVE YOUTH COLLECTIVES

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 1, 1-19 Jan 87 p 5

[Article by Yu. Meshkov under the rubric "In the Presidium of the USSR Academy of Sciences": "Creative Youth Collectives Are Being Established"; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] The Presidium of the USSR Academy of Sciences at the regular meeting, which was held on 24 December 1986, adopted the decree "On the Further Improvement of the Work With Youth at the USSR Academy of Sciences and the Development of the System of Economic Stimulation of Scientific Institutions of the USSR Academy of Sciences in the Carrying Out of This Activity."

Academic youth today constitute approximately a fourth of all the scientists and specialists, who work at institutions of the Academy of Sciences. This is a considerable creative potential, especially if you consider that the most significant scientific achievements and discoveries in the creative biography of the scientist fall to the age of 30-40. The steps envisaged in the decree are also called upon to use with the maximum efficiency the scientific potential of youth. In particular, the executives of scientific institutions and regional subdivisions of the USSR Academy of Sciences are obliged to enlist young scientists more actively in the rapid conducting of planned and the most urgent resourceful research. In this connection the establishment of creative youth collectives (TMK's) with the status of structural subdivisions in the system of scientific institutions of the Academy of Sciences is envisaged. The supervision of the creative youth collective is assigned to one of the young--up to the age of 33-40--staff members, who has been given all the rights and duties of a manager of the structural subdivision of the Academy of Sciences. The creative collective itself is formed, as a rule, of young people up to the age of 33.

The mechanism of the material support of the activity of the creative youth collective and its financing has been developed. The redistribution of the staffs and wage funds of institutions for the establishment of a special reserve of the Presidium of the USSR Academy of Sciences and the Presidium of the Siberian Department of the academy is envisaged for this. It will be formed by means of deductions from the funds of those institutions, at which work with youth is being carried out unsatisfactorily.

It has been decided to hold as an experiment during 1987-89 a competition and examination of the scientific plans and proposals of young scientists of the academy in the area of basic and applied research, as well as the elaboration of new methods, materials, and technologies.

After the completion of the meeting of the Presidium of the Academy of Sciences our correspondent turned to Vice President of the USSR Academy of Sciences Academician Ye.P. Velikhov, chairman of the Commission of the Academy of Sciences for Work With Youth.

"The just adopted decree is a matter of enormous importance for the academy," Yevgeniy Pavlovich said. "Our science cannot develop further by the increase of the number of scientists. The basic reserve under present conditions is the qualitative improvement of work. Great hopes are being placed here on youth and on their far from completely used creative possibilities. It must be acknowledged that today at many scientific institutions of the Academy of Sciences even the most active, searching young scientists have been greatly restricted in their scientific aspirations. The competition and examination of designs and proposals give young people an excellent chance to present themselves publicly. The Presidium of the academy is ready henceforth to make available to the authors of the most interesting and promising scientific ideas all the necessary conditions for fruitful research work. In modern science, especially experimental science, it is impossible to do anything significant single-handed. But, as a rule, there are not even small scientific collectives for those who today are 30-40 years old. Precisely for this reason we now do not have enough revolutionary scientific ideas, new directions, and new scientific schools headed by young, but already competent scientists."

Science by its very nature is revolutionary: almost every serious step on the path of its development involves the sweeping away of what is customary and even traditional. To accelerate scientific and technical progress means, first of all, to stimulate basic research, having actively involved youth in it. Now the Presidium of the Academy of Sciences has an effective mechanism of the stimulation of the activity of institutes with respect to work with youth. Moreover, a mechanism with feedback and economic levers, which make it possible--even as an experiment--to finance specific themes of scientific research. Such a mechanism should force the management of scientific institutions to use intensively their reserves and their young personnel, having given them greater rights, but also greater responsibility. We already have examples of noteworthy achievements of young scientists, who work at recently established academic institutes. These are the Kuybyshev Affiliate of the Institute of Physics of the Academy of Sciences, the Institute of Chemistry of Nonaqueous Solutions, the Institute of Program Systems.... Here young people 30 years old already are in charge of laboratories and manage scientific groups. Doctoral dissertations are being prepared at this age. The establishment of flexible scientific structures, such as, in particular, creative youth collectives are, and the granting to them of greater independence are one of the steps in the direction of the organizational reform in our science.

Let us note that the holding of a competition and examination is important and promising not only for young scientists, but also for the academic institutes themselves. The scientific institution of the Academy of Sciences, from which the best design in accordance with the results of the competition and examination is submitted, will receive the necessary staff and financial support for its implementation by the forces of the young authors who have been united into the creative collective. In other words, the institute, at which the creative youth collective has been established, receives priority in the development of scientific directions, which is backed by the necessary material and technical base. And, on the contrary, the institutions, which "distinguish themselves" by a low level of work with youth, by the decision of the Presidium of the USSR Academy of Sciences will be deprived of a portion of their funds in favor of the creative youth collectives being established at other institutes. This is also the "negative feedback," about which Academician Ye.P. Velikhov spoke. Such a situation should, in the opinion of the members of the Presidium of the Academy of Sciences, significantly stimulate scientific research at all the institutions of the Academy of Sciences and, in the end, contribute to the creation of the conditions for the intensive development of science as a whole.

From the Editorial Board. It is possible to find out about the conditions of the holding of the competition and examination of scientific designs and the peculiarities of the establishment of creative youth collectives at the Commission of the USSR Academy of Sciences for Work With Youth. Address: 117977, GSP-1, Moscow V-334, Ulitsa Kosygina, 4. Phone numbers: 139-73-03, 139-71-64.

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